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EXHIBITION
OF THE
WORKS OF INDUSTRY OF ALL NATIONS,
1851.

PROSPECTUSES
OF
EXHIBITORS.

VOL. II.

MACHINERY.

CLASS V.

MACHINES FOR DIRECT USE, INCLUDING CARRIAGES,
RAILWAY AND MARINE MECHANISM.

COLLECTED UNDER THE AUTHORITY OF THE
Royal Commissioners.

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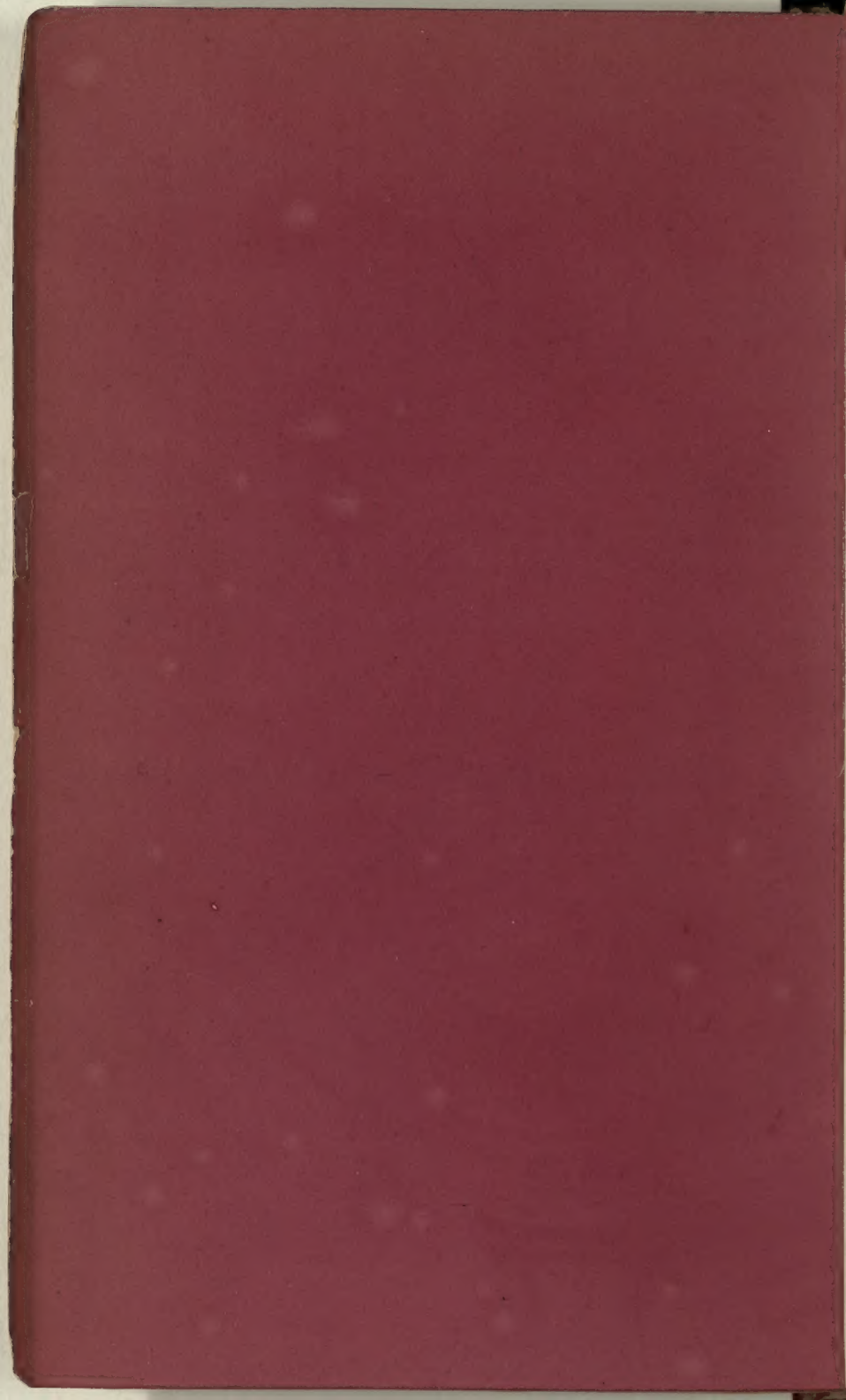
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EXHIBITION OF 1851.

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VOLUME II.

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ANDERSON'S

EXHIBITION PATENT VICTORIA CAR.

Silver-Mounted, Plated Rails round about, finished in the highest style—Lamps, Wings, Colling's Axle, Mats, &c.,	£38 0 0
The same as in the Crystal Palace, Polished Iron Mounting, Lamps, Colling's Axle, without Wings,	30 0 0
Good useful Car, with Plain Brass or Black Mounting, London Rib, or Plain Plush Cloth, Nail Patent Axle, thoroughly painted, without Wings or Lamps,	20 19 0
Wrapper for Do.,	3 15 0
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Lamps, from 16s to £3.	

HARNESSES PRICES.

Plain Set of Brass-Mounted Harness, made of the Best Material,	£5 0 0
Silver-Mounted Harness, Plain,	6 6 0
Do. Do. with Kicking Strap, Double Breeching, highest finish,	8 8 0

CARRIAGE PRICES OF CAR.

From Elgin to Aberdeen,	1 5 0
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All Plain Cars Duty Free, and every Car upheld for Twelve Months, if not loaded above what they are constructed to carry, or if no unforeseen accident occur.

Five per cent. allowed if Harness taken, and net if otherwise.

Appold's Centrifugal Pump for
drainage. Marshes contains One Gallon
discharges its contents 1250 times in a
minute does $7\frac{1}{2}$ ft Cent duty

A cheap Pump for a large quantity
of water with a low lift. not Patented, but
given to the Public, it will pass almost
any thing small enough to go through
there being no valves in action. Particu-
larly well adapted for a tide pump discharging
more water the lower the lift, the pump going
the same speed. other Pumps generally discharge
only their contents, no matter how low the
lift.

A drawing & description will be found
in the London Illustrated News May 17th 1851
also in the Examiner June 14th 1851.

The hand Pump is 3rd diameter, and $1\frac{5}{16}$ thick
it contains the 60th part of a gallon & has pumped
up 150 gallons in a minute, therefore it discharges
its contents 9000 times in that time, in trying
it with a steam gauge we obtained a pressure
51^{lb} upon the inch and vacuum of 14^{lb} although
the Mercury has gone up to 30ⁱⁿ. I believe it has
gone up from the momentum not from the actual
vacuum as it never does so when the Mercury is
kept up to 14^{lb} with a valve to prevent the mo-
mentum there are two gauges placed with it to
give any one an opportunity of seeing the experi-
ment to see what pressure and vacuum the pump
can get with respect to the duty it has not
been ascertained with the small one but with
the large one one foot diameter & 5ⁱⁿ wide
containing 1 gallon it will do 10ⁱⁿ per minute
when it pumps 1500 gallons per minute the part
that gives impulse to the water weighs only 11^{lb}
Although the Pump is only 1 foot diameter & the
two inlet holes are only 6ⁱⁿ diameter, therefore
the size about 8ⁱⁿ square inch it will pass sufficient
water to flow out of a hole 1ⁱⁿ deep 1ⁱⁿ wide & will
will be equal to 22ⁱⁿ inches some people are amused
with the small pump by trying how much easier it
goes to try a great pressure than letting the water
flow out of the nozzle, the pump being moved at the
same speed it arises from this circumstance, sup-
pose it to go fast enough to raise the water about
20 feet without discharging any the water would be
more round like a ring but at the same moment
opens the nozzle to let the water flow through, every
particle of water as it comes, requires considerable
force to put it in motion.

ATHERTON'S MARINE STEAM ENGINE :

EXHIBITED

To illustrate a **PLAN OF CONSTRUCTION** applicable either to the Paddle Wheel or to the Screw Propeller, and adapted for Marine Engine Classification.

THIS Engine has been designed with a view to simplify the construction of the Marine Sway Beam Engine, and to make the same Engine available either for Screw Ships or for Paddle Wheel Vessels.

As compared with the ordinary construction of the Side Lever Engine, the plan now proposed has the following advantages :—

1st. *The Engine occupies less width by the Sway Beam being placed above the Condenser.*

2nd. The Sway Beam being in a central position and connected directly with the Piston and with the Crank, various cross strains are avoided, the Engine is not so liable to breakage as the ordinary Side Lever Engine, and the probable extent of damage consequent on any part giving way is greatly reduced.

3rd. The Cross Head, Cross Tail, Air Pump Cross Head, Cylinder Side Rods, and Parallel Motion Gear, are by the proposed construction *entirely superseded.*

4th. In consequence of so many parts of the ordinary Side Lever Engine being thus done away with, all parts of the proposed Engine are *more accessible and more easily attended to when in operation.*

5th. By means of the two Air Pumps, one on each side of the Main Centre, the Engine is *very nearly balanced*, and therefore less liable than Marine Engines generally, to be brought up in a heavy sea.

In the detail of these Engines all parts are constructed with a view *to obviate the usual causes of breakage.* For instance: the Piston is made without any Junk Ring, (the packing being a metallic ring of extra size, compressed into its seat between the Piston Flanges,) and therefore not requiring the bolts, nuts, and keeps, usually connected therewith, any one of which by becoming loose, as frequently happens, may occasion the breaking down of the Engine. The Steam Slides are so proportioned and adjusted as not to close the exhausting Port till after the turn of the stroke, thereby obviating the danger of breakage by water in the Cylinder, and superseding the Escape Valves; these material advantages being gained at a trifling sacrifice of Steam. The Expansion Gear is on a plan that necessarily operates with precision, at whatever speed the Engine may be driven, and affords a means of *self-registering the expansive working of the Engine.* The Feed Pumps and Brine Pumps are connected and worked by an adjustment Lever, whereby the feed supplied to the

Boiler, and the brine extracted from it, may be always in proportion to the Steam used, as regulated by the Expansive Valve. In these Engines the Feed Pump is worked by the Sway Beam, but, if required, it may be connected directly with the expansion Eccentric.

Diagram No. 1, shews the proposed principle of construction adapted to Screw Ships of War, requiring the Machinery to be below the water line. By this diagram it appears that Engines up to 60 inches diameter of Cylinder, and 2 feet stroke, (which has been found to be favorably applicable to the Screw Propeller,) can be constructed within the limit of height necessary for the lowest Marine Boiler, viz., 8 feet, and the plan affords facilities for the application of multiplying Gear, which in Screw Propulsion has been found conducive to the most effective results. In this case the Engines are placed across the Ship, the Keelson passes between the Air Pumps, and the Sole Plate is bedded down upon the Ship's floor.

Diagram No. 2, shews the same construction of Engine adapted to Paddle Wheel Vessels, by placing the Engines longitudinally in the Ship, and leading the Connecting Rod *up* to the Paddle Wheel Shaft, instead of *down* to the Screw Propeller Shaft. In this case each Engine may have two Cylinders, viz., one at each end of the Sway Beam, the Paddle Wheel Shaft being placed above one of the Cylinders, as usual, with direct action Engines; or the Paddle Wheel may, if required, be placed on a second

motion Shaft, which will afford facilities for the application of differential Gearing, whereby the Vessel may be rendered very effective for towing. These double Cylinder Engines may also be adapted to Screw Ships by being placed across the Ship as in *Diagram No. 1*, and connected by multiple Gearing with the Screw Shaft.

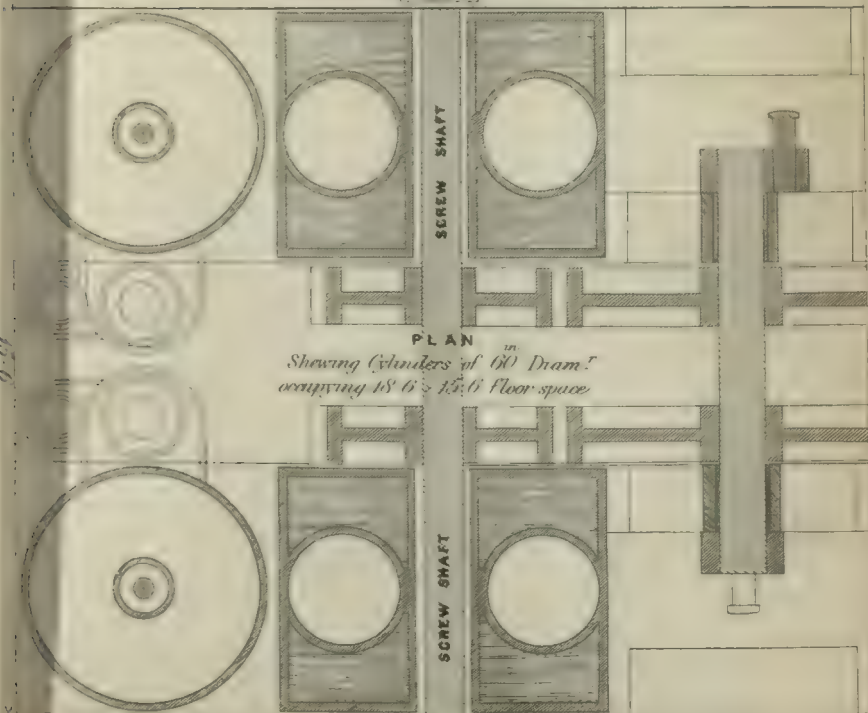
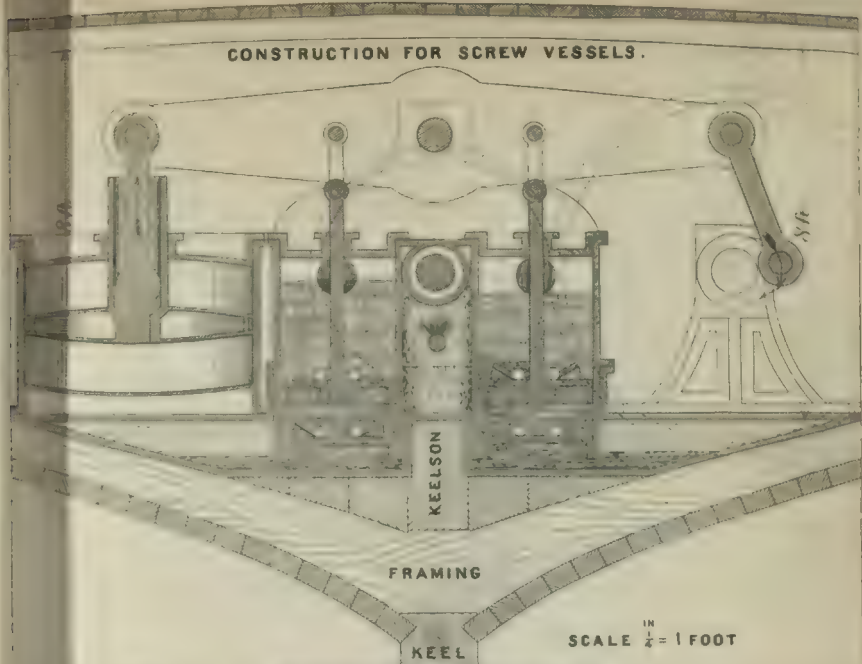
This plan of Engine, adapted either for the Screw Propeller or for the Paddle Wheel, is exhibited to illustrate the practicability of Steam Fleets, both Commercial and National, being fitted with Engines of *definite construction* and of a *classified gradation of sizes*, whereby it is calculated that ten different sizes only would meet all the requirements of Steam Marine Service, now employing, in Great Britain, upwards of 1000 Engines of different sizes and constructions, by which classified system, the original Equipment and subsequent upholding of Steam Fleets would be greatly expedited and economised, as is more fully explained in a brief Treatise on "*Marine Engine Construction and Classification*," by CHARLES ATHERTON, Chief Engineer, Royal Dock Yard, Devonport.

*Agent, ALEX. GORDON, Engineer, 22, Fludyer Street,
Whitehall, London.*

H. V. HARRIS, PRINTER, FORE STREET, DEVONPORT.

DIAGRAM N^o 1.

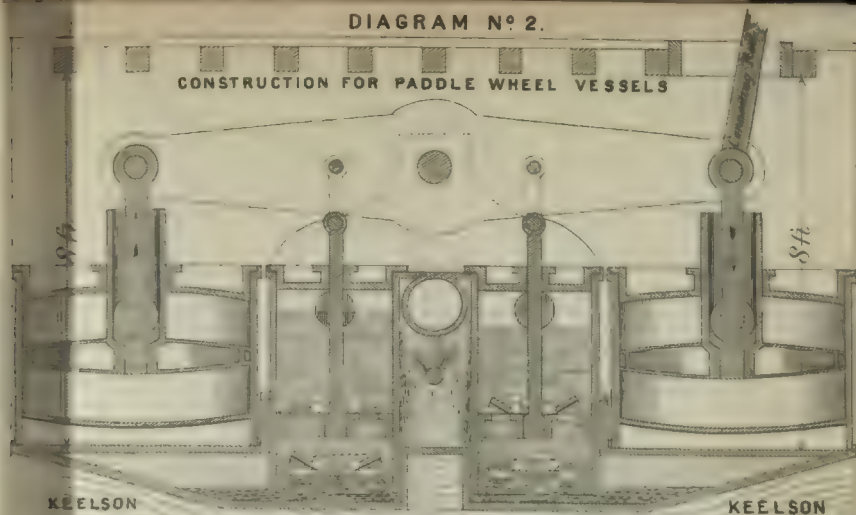
CONSTRUCTION FOR SCREW VESSELS.



18' 6" x 15' 6" Floor space

DIAGRAM N° 2.

CONSTRUCTION FOR PADDLE WHEEL VESSELS



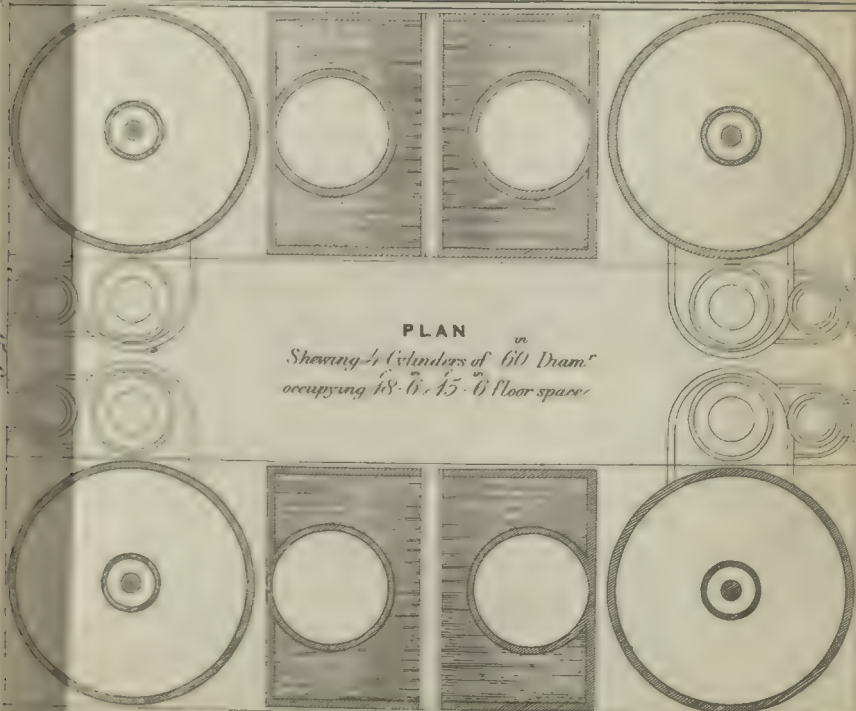
FRAMING

KEEL

SCALE $\frac{1}{4}$ IN = 1 FOOT

PLAN

*Showing 4 Cylinders of 60 Diam^r
occupying 18-6, 15-6 floor space*



18-6

22 Fludger Street, Westminster.

26 August, 1850.

MR. ATHERTON, Chief Engineer at H. M. Dockyard, Devonport, having invented and placed at the disposal of the Lords Commissioners of the Admiralty a new arrangement of Expansion Gear, with a view to supersede the Cam Motion usually employed on board Steamers begs to inform *Messrs.* that with the concurrence of their Lordships he has taken out a Patent for the Invention; and as Mr. Atherton's duties in H. M. S. do not admit of his giving attention to general business as an Engineer, he has appointed Mr. Alexander Gordon, Engineer, 22 Fludger Street, Westminster, as his principal Agent for the prosecution of the Patent, to whom he begs to refer all persons who may be disposed to entertain the subject of the Invention.

Mr. ATHERTON begs to submit the following Remarks on Expansion, with a brief Description of his Invention.

In publishing for the notice of the mercantile interests the system of Expansion Gear which I have invented and placed at the disposal of the Lords Commissioners of the Admiralty, for the use of the Royal Navy, if approved for that service, I beg to submit, for the consideration of Steam-engine Proprietors, the following particulars, in illustration of the defects of the Cam-motion Expansion Gear usually adopted in steamers; and also to describe my recently-invented Eccentric Expansion Gear, whereby the defects of the Cam-motion Expansion Gear are obviated, and whereby the economy derivable from the principle of expansion may be practically realised.

The advantages of working steam expansively being admitted, the mode of effecting that object is the matter which deeply affects the interests of Steam-engine Proprietors; particularly the interests of Steam Shipping Companies; and more especially the Owners of Screw Vessels, of which the engines are worked at unusual speed.

In marine engines, the expansion of steam is effected either by the steam slide or by the cam-motion expansion slide. When the steam slide only is used, the steam is not usually cut off at less than two-thirds of the stroke; and to obtain the remaining small degree of expansive action, through about one-third of the stroke only, the danger of breaking down the engine is incurred, by the liability to water being confined in the cylinder, or else the steam does not act with its full force on the piston, by reason of the steam-ports not being fully opened; and in all cases, the very limited extent to which steam is worked expansively by means of the steam-slide alone, is far short of the limit to which the principle of expansion may be advantageously carried out; consequently, an additional slide is employed, which is driven by the apparatus known as the cam-motion, by the operation of which the expansion slide receives a sudden motion or impulse, whereby the steam-way is opened, and again another sudden impulse in the opposite direction, whereby the steam-way is closed; so that, in each revolution of the engine,

the steam-way having to be opened twice and closed twice, four such impulses or sudden motions, in alternately opposite directions, require to be communicated by the cam motion to the expansion slide. It follows, therefore, that in marine engines, making, for example, 20 revolutions per minute, the expansion slide and all the apparatus connected therewith, weighing probably several hundredweight, have to be started into motion and as suddenly arrested 80 times per minute; and in the case of direct-action engines making seventy-five revolutions per minute, as is frequently required of engines even of large size driving the screw-propeller, the number of such distinct movements to be communicated by the Cam Motion to the expansion slide, amounts to 300 per minute; and, further, supposing the steam to be taken on at the turn of the stroke, and to be cut off at one-eighth of the stroke, the expansion slide will require to be started into motion, arrested, and again started upon its back motion, all in the period of about one-tenth of a second, a requirement obviously unattainable.

Such being the attempted action of the Cam-Motion Expansion Gear, it fails of attaining the required precision; the joints soon become loose, and the noise of its operation insufferable; consequently, its constant application is soon dispensed with, and the economy which ought to be derived from the principle of working expansively fails of being realized.

To obviate the defects above referred to, it is now proposed to drive the expansion slide by means of an ECCENTRIC MOTION, as by the drawings annexed. It will be observed that the expansion slide being driven by an eccentric wheel, is not subject to any sudden impulse, but is kept in continuous motion, like the steam slide; it will consequently operate as noiselessly as the steam slide; be as little liable to derangement; and work with the same invariable precision, whatever be the number of revolutions at which the engine may be driven.

CHARLES ATHERTON.

DESCRIPTION.

Referring to Fig. 1—An Engine is supposed to be taking on the steam at the extremity of the slide; C is the axis of the crank-shaft on which the expansive eccentric wheel is supposed to be placed; Cg is the medium direction of the eccentric rod on which the distance Ca is taken, equal to the steam aperture E through the slide. Also, Cb is taken equal to Ca, and from the points (a), (C), the lines (ax), (Cy), (bz), are drawn perpendicular to (Cg). It will be found that if the slide be driven by an eccentric wheel, having its centre at (a), and the connexion with the slide be completed, as shown by the drawing; Ca will be the radius of the circle described by the centre of the eccentric wheel, the throw will be twice Ca, and the aperture E of the slide will not pass beyond the corresponding port E', consequently steam will be admitted throughout the whole revolution; if, however, on the line (ax) we take any point (p), and bring the centre of the eccentric wheel up to the point, then Cp will be the radius of the circle that will be described by the centre of the eccentric wheel, which circle will pass beyond the limits of the faces (ax) and (bz), and it is evident that whilst the centre (p) of the eccentric wheel is in the act of passing between the lines (ax) and (bz), the aperture, E, of the slide will be passing the port E', and steam will be admitted; but when the centre of the eccentric wheel is beyond the limits of (ax) and (bz), the faces F of the slide will be opposite the port E', and the steam will be cut off. It will be observed that the angles pCs, s' Cp', represent the portions of the revolution during which the steam will pass the expansion-slide, and the angles sCs' and p' Cp represent the portions of the revolution during which the faces F of the slide will be opposite the ports E', and consequently for these periods the steam will be cut off; and it is apparent that the farther the point (p) is distant from the point (a), the smaller will be the angles pCs and s' Cp', in comparison with the angle sCs' and p' Cp; that is, the smaller will be the period during which the steam is admitted, in comparison with the period during which the steam is cut off.

If, therefore, we so construct an eccentric wheel, that it be properly seated upon the shaft, and be so arranged that its centre may be made to

traverse at pleasure on the line (ax), we shall, by thus altering the position of the eccentric wheel, produce the effect of varying the degree of expansion at pleasure as may be required.

Figs. 2 and 3 show one of the numerous methods of construction whereby an eccentric wheel may have the required property above referred to; viz. its centre being made to traverse at pleasure on the line (ap) the line (ap) not passing through (C), the axis of the shaft, but passing at a given distance (Ca) therefrom.

K is a skeleton eccentric wheel.

L, the void space of the skeleton eccentric wheel.

M, a block fitted upon the shaft, and either fixed or connected with a clutch, the opposite sides being parallel to each other and to the line (ap), upon which block the skeleton eccentric wheel is made to slide or traverse the required distance (ap) or any part thereof.

O, a screw fixed to the rim of the eccentric wheel, and called the leading screw.

R, a nut fitted within the block M, working upon the screw O, and made to turn like a swivel by means of the arms projecting from it forming a ratchet wheel, whereby the nut R may be turned by hand when the engine is not in motion, or by one or other of the moveable finger-pieces ZZ, when the engine is in action. Or, instead of the nut R being furnished with the ratchet-wheel arms, it may be furnished with a screw-wheel, and be operated upon by a tangent screw.

It is apparent that by this construction the centre of the eccentric may be made to traverse at pleasure upon the line (ap), even whilst the engine is in motion.

The expansion-slide may be either flat, as in Fig. 1, with one, two, or more apertures, E, or it may be cylindrical, as in fig. 4; but, in constructing it, care must be taken that the width of the respective faces, F, between the apertures of the slide, may give a sufficient range for the extreme travel of the slide when working the steam expansively in the greatest required degree.

Fig. 1.



Fig. 2.

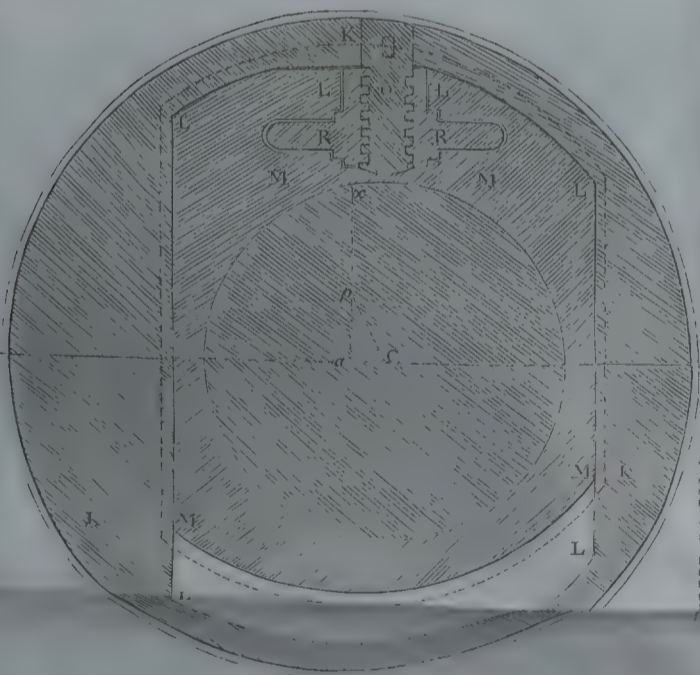


Fig. 3.

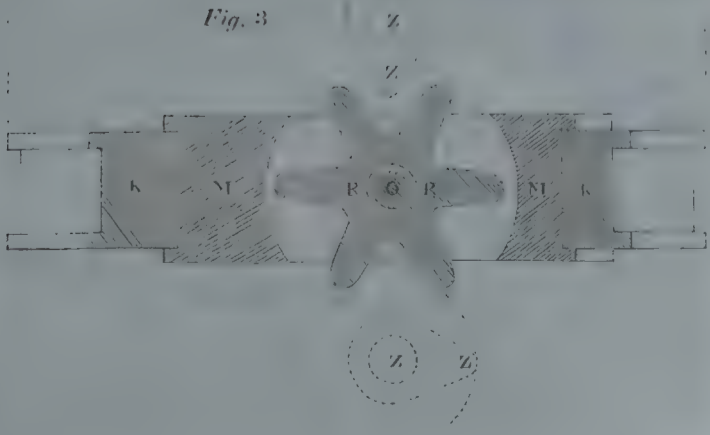
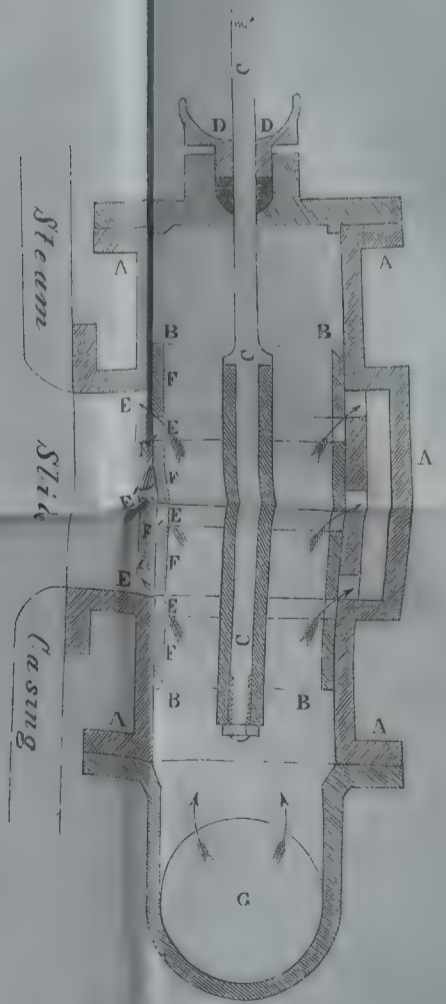
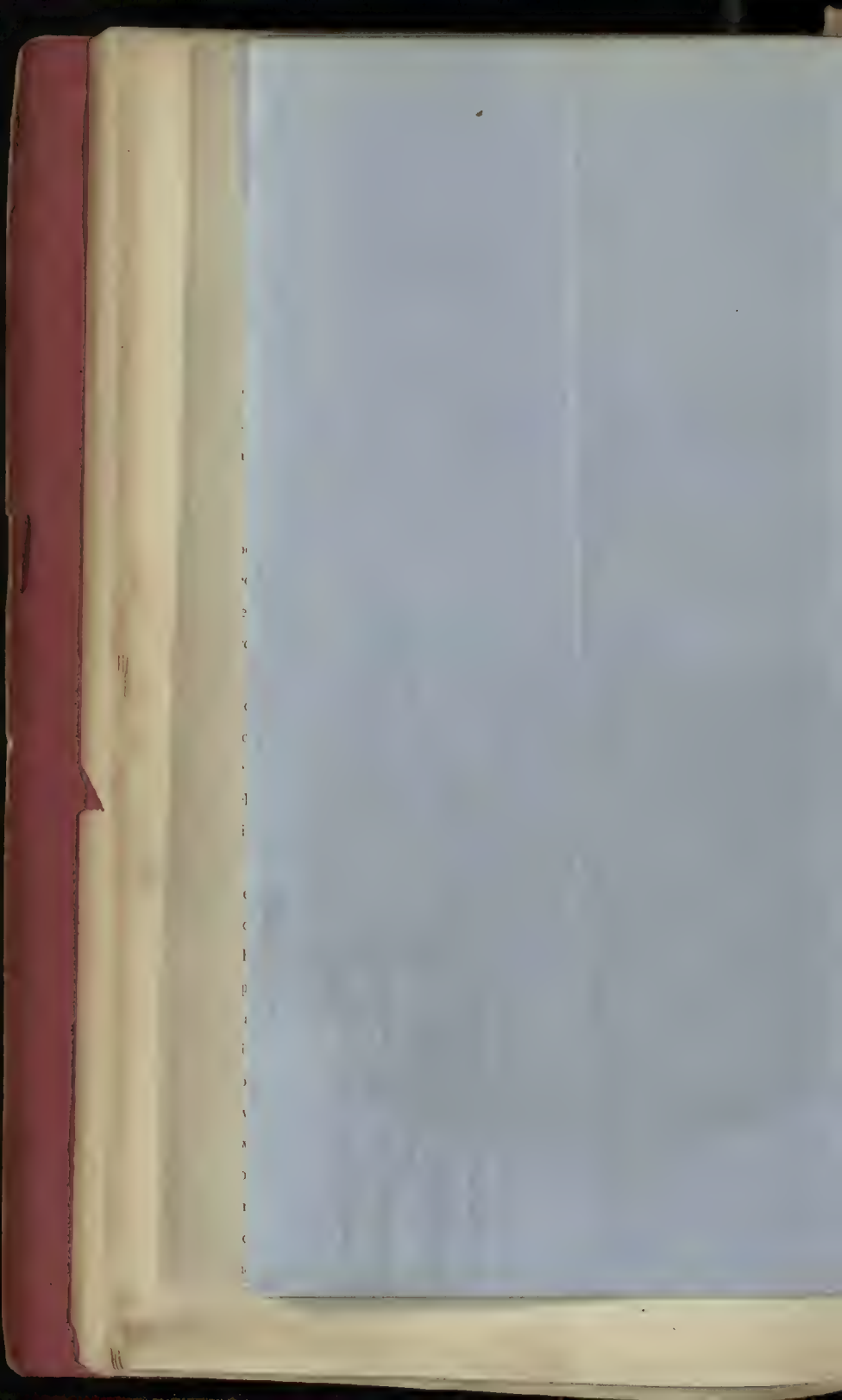


Fig. 4.







BADDELEY'S PORTABLE FIRE-ENGINE.

(REGISTERED PURSUANT TO ACT OF PARLIAMENT.)

It has been long well known that a small quantity of water if PROMPTLY and JUDICIOUSLY applied, will extinguish a considerable fire; but no apparatus hitherto devised has sufficiently realized this practical truth. A suitable apparatus is now for the first time submitted to the public, in the form of a COMPACT, CHEAP, PORTABLE, yet POWERFUL and EFFICIENT FIRE-ENGINE, capable of being instantly applied, easily managed (even by females), and not liable to go wrong or get out of order.

This Fire-Engine consists of a powerful force-pump and air vessel, combined in a single barrel, to which is attached ten feet of flexible hose (any additional length being affixable at pleasure), a branch-pipe, and jet-spreader.

IN USE.

This Engine being held in a pail, tub, bucket, or other supply of water, and the handle worked up and down, a powerful jet of water will be projected to a distance of thirty or forty feet, at the rate of eight or nine gallons per minute—thus enabling a continuous stream of water to be directed wherever a fire may be burning, without exposing the operator to any personal danger or inconvenience. Or, in case of fire in workshops, abounding in wood and shavings—in stables filled with hay and straw—and in bed-rooms, where flames may be revelling amidst curtains and draperies, the jet-spreader may be most advantageously employed. By merely pressing the thumb upon a small lever, the jet of water is instantly divided, and scattered in the form of a heavy shower, which drenches the whole extent of burning surface, and effectually extinguishes the fire. By means of this apparatus a *very small quantity of water* becomes really available for extinguishing a *very large burning surface*, while the damage done by water is the smallest possible. With the JET-SPREADER applied, a single pail of water becomes more effectual for extinguishing fire than a much larger quantity thrown wastefully from buckets, or even applied in the form of a jet, for

NO FIRE CAN LIVE UNDER THE ACTION OF THE SPREADER.

As a check against the inroads of fire from contiguous burning buildings, Baddeley's Portable Fire-Engine is invaluable, machines of smaller power having for some time past been employed by the London firemen with great advantage. For taking water off floors after the fire is extinguished, this Engine is peculiarly suitable.

No shop, warehouse, railway-station, mansion, or hotel in the kingdom should be unprovided with this approved and inexpensive safeguard against the spread of fire.

As a Garden-Engine this apparatus is unrivalled; the Spreader (which never chokes) enables the water to be thrown over the trees and shrubs in a genial shower, washing off the insects, &c., without injury to the plants.

PRICE, WITH HOSE, &c., &c., COMPLETE, £3 3 0

MANUFACTURED BY THE INVENTOR, AND SOLD BY ALL RESPECTABLE SHOPKEEPERS THROUGHOUT THE KINGDOM.

For Licences to Manufacture apply to Mr. Baddeley, Agent for Patents and Registration of Designs,

29, ALFRED STREET, ISLINGTON, LONDON.

No. 1.

IMPROVED SPORTING DOG CART,

INVENTED AND MADE BY

GEORGE HENRY BASKCOMB,

OF

CHISLEHURST, KENT,

(AN AMATEUR).

General configuration new, seat intended for three persons; wire basket is for game, et cetera, the wicker basket for dogs when required, either or both of which may be used, or not, at pleasure; the foot board is of wire work and opens, the bearers or bars supporting the same are hollow tubes, for lightness; the draft is direct from the axle by chains, supported by and passing through eye stays, dispensing entirely with the usual trace bar; the traces are attached by spring hooks; the mud wings so placed prevent any dirt from flying upwards; the lamp so constructed and placed answers the purpose of the two lamps usually placed at the sides, throwing equal light to the near and off side; this carriage is made of iron, ash, and whalebone, and from the height of wheels and length of springs runs exceeding light and easy.

G. H. B.

SELF-ACTING SIDING STOP,

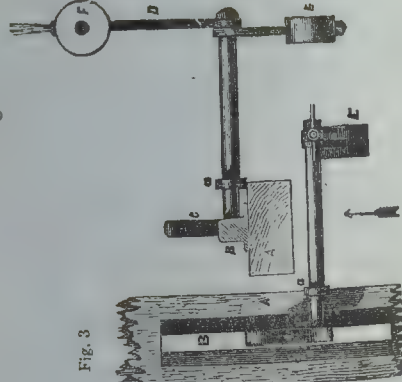
REGISTERED BY G. E. BECKERS, PADDINGTON,

OCTOBER 17th, 1850.

Fig. 2.



Fig. 1.

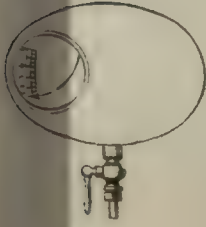


DESCRIPTION.

Figure 1 is an end, and Figure 2 a side view, and Figure 3 a plan of this Stop. A A is a longitudinal Railway Sleeper; B B the rail, a portion of which is cut out to allow the Stop to enter it, as in figure 3. C is a Stop, which projects over the rail, and is free to move in one direction upon being struck by the wheels of a carriage or truck entering the Siding. The Stop is mounted on one end of a shaft, supported in a bearing, a. The shaft carries at its outer end a lever, D, and counterweight, E. F is a Signal Disc attached to the lever, D. The action of the Stop is as follows:

Supposing a carriage, or train of carriages, to be about entering the Siding in the direction of the arrows: the wheels come into contact with the Stop, C, which being free to move forward in the direction of the arrow, b, lies flush with the rail, and allows the carriages to pass on into the Siding. With the forward motion of the Stop, the lever, D, is depressed, and the weight, E, consequently raised, as shown by the dotted lines in figure 2. When the last carriage has passed the weight falls down, raises the signal and lever, and restores the Stop to its original position.

When required to take a carriage or train out of the Siding, the lever must be forcibly pressed down by hand.



E. BOURDON'S PATENT

METALLIC STEAM-GAUGE.

N^o 1108 of the official Catalogue.

From the MINING - JOURNAL of 27 July 1851.

A NOVELTY IN SCIENCE.

So numerous are the attractions at the World's Exhibition, that it is more than likely that an object of much interest to the scientific world, and to engineers and machinists, may have escaped the attention of many, which would otherwise have obtained their particular notice. We allude to a collection of instruments exhibited by Mr. E. Bourdon, of Paris, in the shape of pressure gauges, vacuum gauges, barometers, thermometers, &c.

Such instruments, with regard to their uses, convey little idea of any novelty worthy of particular notice; but, in this instance, it is the newly-discovered physical law by means of which these instruments are made to act which excites our attention, and, we can add, our admiration of the clever and ingenious manner in which M. Bourdon's accidental discovery has been in so short a space of time applied by him.

It appears that if a brass or thin sheet iron or steel tube be nearly flattened, and afterwards coiled, the effect of an inward pressure of steam or water is to force it towards its original shape—the first effect produced being that of tension towards elongation, whether the flattened tube be coiled or twisted; and a contrary effect is produced by unresisted exterior pressure. That in shaping it, as we have said, a certain degree of elasticity having been given to the metal, as long as it is not absolutely forced beyond a given point of its acquired shape, it will act as a spring to the greatest perfection, and work from or back to its newly-acquired shape, as the pressure upon it may be applied. This law has been worked out with admirable ingenuity. Thus, a simple piece of well-made metal tube is first partially flattened in all its length, and coiled nearly to a circle. One end of it is stopped up, while the other end is left open, to receive the pressure of steam or water. To the end that is stopped a hand is fixed, which is so placed as to show the variations in the position of the tube upon a dial marking the degrees of pressure. Here is a most perfect pressure gauge, of a simplicity hitherto beyond conception. A vacuum gauge is made of the same simple piece of mechanism, reversing the application of pressure, and, consequently, the effect upon the tube. For instance, as exhaustion takes place in the tube, so does its power of resisting the pressure of the surrounding atmosphere which acts upon it vary, and it consequently again coils under that pressure in regular ratio with the variation of it, and is made to indicate the degree of vacuum in the condensers of an engine. A barometer is made in the same simple manner, by completely exhausting the air from the coiled tube, and hermetically closing it. As the pressure of the atmosphere varies, so does the tube give under it in proportion; and thus, with the greatest accuracy, such an instrument indicates the smallest variations of atmospheric pressure, and forms one which, from its solidity and simplicity, we consider to be preferable to any sort of barometer as yet produced.

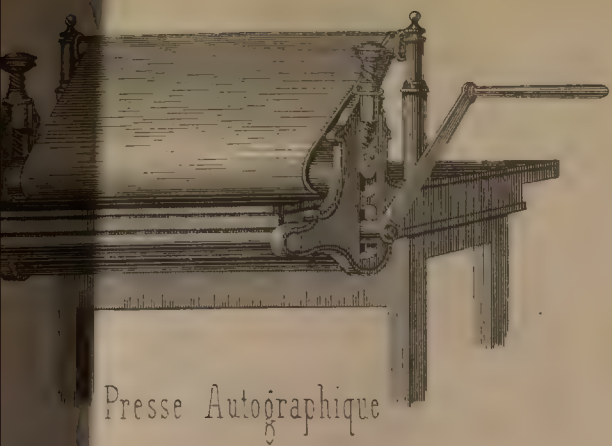
To form a thermometer the same shaped metal is employed; or if for indicating the temperature of liquids, the tube is generally twisted in its whole length, instead of being coiled, and being filled with alcohol it is well closed; and thus, as the temperature varies, so will the alcohol in the tube expand or contract, and force the tube to observe its action, and indicate the variations of temperature, either of the surrounding atmosphere, or of any body or fluid into which it may be plunged. Several other applications of this discovery in physical science have been made by the inventor—such as a steam-engine indicator, a gas regulator, and even a model of a steam-engine, &c. Yet we cannot but think that some further applications may be made of this discovery, and advantage derived from it; and we, therefore, take the opportunity of bringing it to the notice of our countrymen, and with the greater confidence, as we have had the assurance of the perfect satisfaction which these pressure gauges have given to some of our eminent engineers, including Messrs. Maudslay, Penn, Napier, Simpson, &c., and of their general adoption on locomotive engines in France, by order of the authorities of that country.

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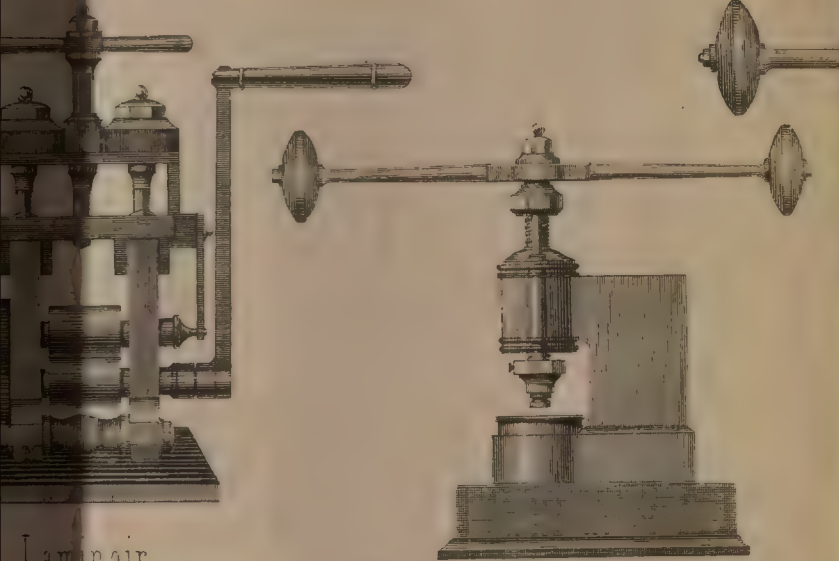
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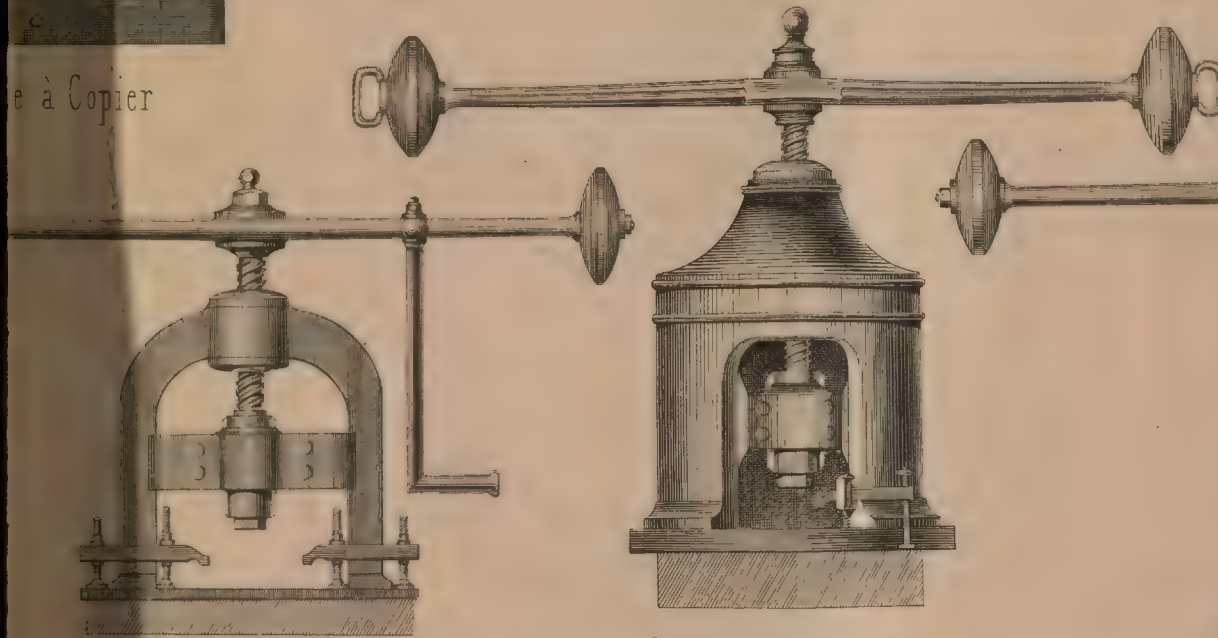
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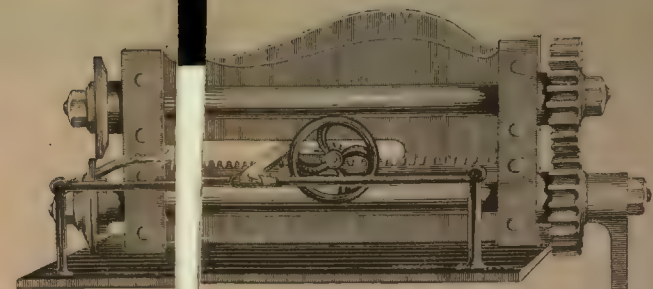
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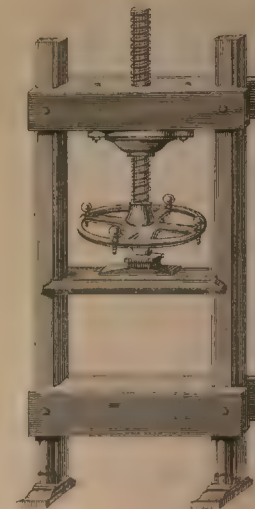
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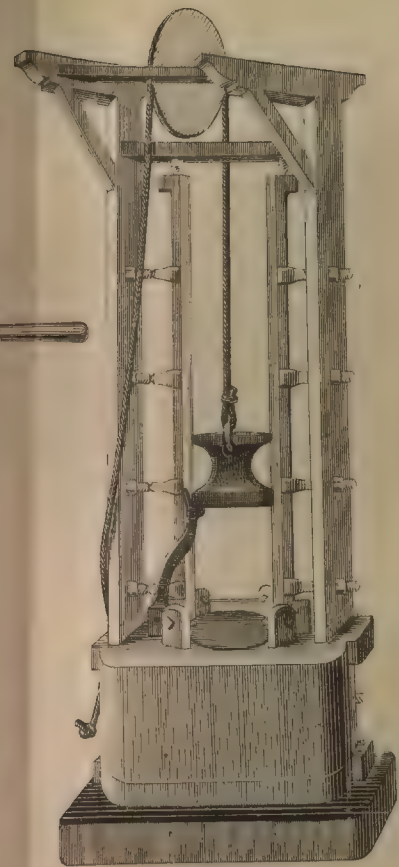
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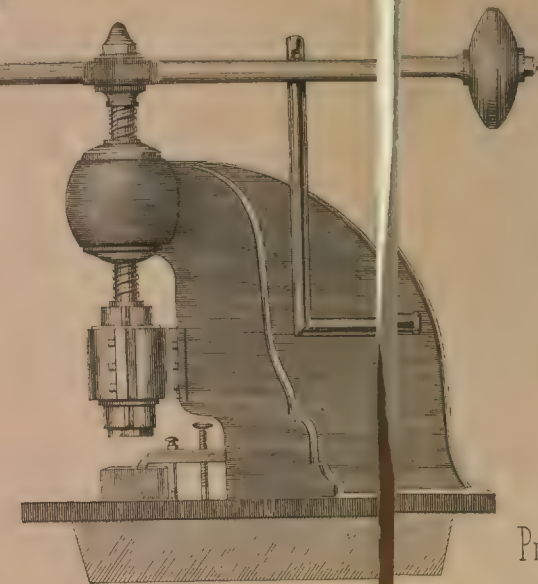
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THE

CONICAL FLOUR MILL COMPANY.

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THE
CONICAL FLOUR MILL COMPANY

Provisionally Registered pursuant to the 7th and 8th Vic. Cap. 116

(A Royal Charter or Act of Incorporation to be applied for.)

CAPITAL £100,000—with power to increase.

*In 10,000 Shares of £10 each.—Deposit 1s. per Share, (according to the
until complete registration.*

First Call £3, and all subsequent Calls £1 per Share, with one month's notice

Trustees.

JOHN PHILIP FISHER, Esq., (FINNIS & FISHER,) 79, Great Tower-street.
HENRY LARCHIN, Esq., Ratcliff Cross.

Provisional Directors.

W. L. T. ROBINS, Esq., Great Scotland Yard, CHAIRMAN.
BRYAN CORCORAN, Esq., 36, Mark-lane.
NATHANIEL IRON, Esq., Tulse-hill.
HENRY KIRK, Esq., 15, St. James's-square.
THOMAS MIDDLETON, Esq., Loman-street, Southwark.
WILLIAM PAVITT, Esq., Anchor Flour Mills, Wapping.
WILLIAM SHAW, Esq., 346, Strand.

Auditors.

WILLIAM BAGSHAW, Esq., 37, Coleman-street.
The Second Auditor to be appointed by the Shareholders.

Bankers.

Messrs. ROGERS, OLDING & Co., Clement's-lane.

Solicitors.

Messrs. SHEARMAN & SLATER, No. 23, Great Tower-street.

Secretary.

B. COVENEY, Esq.

OFFICES—No. 11, Great Tower-street, London.

PROSPECTUS
OF
THE CONICAL FLOUR MILL
COMPANY.

It is scarcely necessary to observe, that the vast resources of England for the last fifty years have depended on her improved machinery. It has indeed been said with equal truth, that her independence as a nation rests upon her being twenty years in advance of her neighbours. And never was it more necessary to maintain such pre-eminence than at this time of great struggle, when the importation of wheat and flour has been made free to all nations, before the agricultural and milling interests, and the large capitals invested in them, have been prepared to meet the competition of the world. Thus it is that improvements in these important departments of British industry are now more especially occupying the serious attention of some of the first minds in the kingdom—from the Prince to the peasant—as a necessary requirement for their profitable continuance.

Flour, like cloth, is a manufactured article, because wheat must pass through various processes before it can be converted into flour. Therefore it is plain, that eco-

nomy in steam power and labour in working up the raw material, and a superior process of manufacture, are objects of considerable importance in making an article of larger consumption than any other, particularly as the price of bread generally regulates the price of most other native commodities.

So little improvement, however, has taken place in making flour, that wheat is still ground pretty much on the same expensive and deteriorating principle as it was five or six centuries ago. Struck with this remarkable fact, in the present age of refined mechanical ingenuity, Mr. Westrup himself a miller all his life, and therefore thoroughly acquainted with the defects of the old system, was led, after improving and abandoning several plans, to an entirely *new principle* of grinding wheat. And having constructed and applied one of his new mills to the steam-power of his ordinary mill, it was found to remedy very completely the whole of the evils of the present system. We have more confidence then in the soundness of an invention, which has sprung from the persevering ingenuity of one of the same class of men to which the world already owes so many of its important and profitable improvements in the useful arts—that manufacturing class whose daily labours make them best acquainted with the defects of their trade, and whose mechanical genius suggests the simplest and most efficient means of remedying them.

Thus a great improvement in making flour is a fact accomplished, after centuries of use of an old machine, which probably is the only remaining transmitter of power that connects an age, remarkable for its improvements in the productive powers of human industry, with one of mechanical barbarism.

It was after twelve months' experience, and very careful trials against one of the best steam flour mills on the old

principle, that the Directors of this Company (some of them well known in the trade to be largely connected with the present system) became so satisfied of the superiority of the new principle, as to agree to purchase the exclusive patent-right, with the view of forming a Company for its introduction, believing it will be a good investment, and of great public benefit; it being well known that no unaided inventor ever possessed the combination of capital and business requirements necessary to establish his own inventions. Society, indeed, scarcely owes less to the introducers of valuable improvements in the arts of life, than to the inventors of them.

It will be seen by the Certificates of bakers who have been using the Conical Mill flour, that three or four more 4 lb. loaves can be got from a sack of that flour than from the same weight ground on the old principle; also (Certificate No. 2) that it is "much better and much stronger than the flour from the same wheats ground in the usual way," and that it possesses other advantages well appreciated by the trade; among these, that of keeping longer, an object of much importance. (Certificate No. 3.)

Now every one knows that the exigencies of every business *compel* men, in competitive times like these, to buy the best article at the lowest price. It is therefore but a fair inference that not a baker, pastry-cook, farmer or family in the country, will buy flour ground on the old principle, when they can have, at the same price, a better and more bread-making article, and one that will keep sweet much longer.

Thus, by those simple principles which ever govern men in their own business, a large and certain sale of an article of the largest consumption in the world may fairly be considered as secured to this Company, by the exclusive patent-right of this invention.

But the Engineer's Report shows, that not only is a larger yield of flour thus obtained, but that it is obtained at only "*a little more than one half the cost of the steam power, fuel, and labour usually employed;*" equal therefore to a saving of nearly 100 per cent., as explained at page 14.

Thus again; not only is the ordinary profit on a large and certain sale reasonably reckoned on, by making a better and more productive article; but an unusual profit by a much cheaper method of making it, which will leave such ample margin for all casualties, as will enable the Directors even to reduce the price to the trade, should circumstances arise to make it needful.

Such then are the elements of a great success; of one of those safe and profitable investments which do not seem often combined, that lead the Directors to believe a Company of this particular nature will be highly remunerative, so long as it is managed by parties practically acquainted with the subject, and on the principle which will guide the present Board, that of combining the utmost economy with the utmost efficiency in every department.

The extent of the Milling Trade, and the large importance of such a new principle as the Directors believe will in time remodel the present system, cannot be better shown than by the following extract from *Blackwood's Magazine* for June last, p. 754:—

"This branch is a much more important one than we should be apt at first sight to imagine. According to the calculation of the millers themselves, 160 pairs of stones are required to grind flour for the consumption of 200,000 persons. Estimating the population of England at eighteen millions 14,400 pairs of stones would be required to supply them with flour. Each pair requires a four horse power,* so that 57,600 horse powers are engaged

* The writer had erroneously calculated 10 horse power as required for each pair of stones, which is here corrected to 4 for the average, and the reduced estimate made throughout accordingly.

in the grinding of flour for England. It is impossible to estimate the cost of machinery of that extent, with accommodation and granaries for wheat, at less than £100 for each pair of stones; and probably in this calculation we are greatly below the mark. But if we assume that rate, it will follow that the capital invested in flour mills in England is nearly one million and a half sterling, exclusive altogether of the cost of wheat-stock and sacking. The number of millers in the United Kingdom was, according to the census of 1841, 30,051, exclusive of the servants and labourers they employ. The importance of this interest, we presume, will not be gainsaid."

Inseparably connected is this great interest with British agricultural industry, which forms one of the largest elements of the prosperity and independence of the nation. There is, in truth, no more fruitful, no purer, source of the common wealth than agriculture, on whose broad and imperishable basis rest the glory and greatness and freedom of the state. But every intelligent mind must see, that if this staple branch of British prosperity is destined in future to contend against the world, it will be best protected by the same native invention and skill and capital as, in every other department of national industry, have enabled the heaviest taxed people and the dearest labour, not merely to contend with, but generally to command the markets of the world against the manufactures of the lightest taxed nations and cheapest labour of the globe. This has only been done by remarkable perseverance, energy, and judgment, in combination with improved machinery. And as the manufacturer has done, so must the farmer now do, to improve his position.

The Directors do not offer this more economical machine to farmers or millers as a remedy for their distress. It is however a movement in the right direction; and only by more skill and economy in small things, and by taking advantage of every profitable improvement, can an aggregate of saving be effected at all sufficient to meet the

exigencies of the times. No manufacturer gets large profits now, nor can make large savings by any one thing; neither can the farmer or miller expect to do so. It is the littles that tell. And when the economy of machinery is as fully valued by the agricultural as it is by the manufacturing interest, every large farmer in the kingdom will probably have his two or three horse-power steam engine to grind his corn, and to do those other mere mechanical operations of the farm which coal and iron can now do much better and much cheaper than manual labour. For henceforth steam, unwearied, is destined to bear the drudging toil of the world, as well in agriculture as in manufactures. And nothing, as before remarked, but capital and labour, more directed by science and more aided by machinery, can save the great agricultural interest of this country from still greater misfortunes.

Of the large extent then of the business of this Company some opinion may be formed from the preceding principles which may be thus finally summed up:—This Company will have the exclusive right of making, and of granting licenses to make, at little more than one-half the usual expense of fuel and labour, a better and more productive article, one that none of the population can do without, and the raw material of which, at only 40s. a quarter, costs more than forty millions a-year.

As some more direct guide, however, estimates have been made by those engaged in the trade, upon 60 pairs of stones on the new principle, working the same time as other large mills; and after making every allowance, they show a clear dividend of 10 per cent. But 60 pairs of stones are only the two hundred and fortieth part of the number shown by *Blackwood* to be now at work in England alone. Suppose, however, the Company prefer limiting their own operations to 60 pairs of stones, in order to benefit the

millers by granting licenses. It is not too much to assume that, as soon as they find mills round and about them making flour at a cost so considerably less than their own mills, and sending out a better article all will prefer, they will be glad to be also benefited by a license. For according to the writer of Certificate No. 2, who says:—"I should like all the flour I use to be made on your principle;"—wherever this can be got, none other will be bought. Now the charge for a license (within a certain distance of this Company's operations) will not be less than £10 per Conical Mill per annum; but as this will grind nearly twice the quantity with the same power as the common stones, it will not amount to one half-penny per sack of flour; for which, according to the Certificates, three more quartern loaves per sack will be gained, and considerable fuel saved. Then, according to *Blackwood*, (14,400—60=), 14,340 pairs of stones will remain on the old principle; from which it may safely be inferred that a considerable revenue will be derived for licenses, which will enable a bonus to be declared, in addition to the dividend.

These calculations might be extended, were it known what further number of stones are in operation in the British possessions in America, Canada, Van Diemen's Land, the Channel Islands, and other colonies, in which this invention is also protected; whilst the exclusive right of the Conical Flour Mill for the great corn-grinding countries of France and Belgium will be a protection to the English millers, and the business of this Company.

This invention has been highly spoken of by papers of influence, among them more appropriately, by the *Mark Lane Express and Agricultural Journal* of May 26th and July 7th. And the following ingenious calculation, given in the *Illustrated London News* of July 19th, will

show in what an important light this improvement is considered by another portion of the press:—

“ These data, which have been most satisfactorily established, induced to calculate the advantage that might be derived were this improved method of manufacture to be generally adopted. Taking the population of London to be 2,500,000, and inferring that each person consumes annually, according to the last statistics, the produce of a quarter of wheat, which is about 382 lbs of flour, and this mode of grinding will produce three 4 lb loaves more to the sack than the old method, there will be for London alone a gain of 10,232,142 4 lb loaves from the same quantity of wheat. Again, taking the population of England at 20,000,000, and valuing the 4 lb loaf at 1s and calculating upon the increase of three loaves to the sack, there will be a gain to the country at large of the enormous amount of £2,046,428 per annum—a sum nearly equal to half the Income Tax as at present levied.”

Two objections may possibly be made to this Company
1st. That it is a monopoly. 2nd. That it will seriously interfere with the interests of the millers. The worst monopoly no longer affects us. We look to results, not to terms, and the public good is now the end and aim of all legislation. This Company therefore is quite in accordance with the spirit of the age, for it has the public good for its object; to give this large increase to the bread of the people. The aims too of our own age are all gigantic. The day for petty dealings has gone by. Thus it is that the tendency of all enterprise is the centralization of large capitals, the combination of great dealings and many branches of trade and business in the same hands. To this beneficial tendency, bringing together some of the finest intellects and largest capitals in the country, we owe the great physical improvements of our age; railways and steam navigation companies, joint-stock banks, life, fire, and marine insurance associations, docks and canals; in short, some of the noblest monuments of industry and enterprise, the most excellent benefits ever conferred upon mankind. Yet all would have been cried down at their commence-

ment as gigantic monopolies, had this antique term of opprobrium—now but a barrier to progression—possessed any longer significance. We have besides the large commercial houses, almost private companies, the great Manchester warehousemen, carriers, distillers, brewers, bankers, engineers, all sweeping away the small houses. And though these be absorbed; as were the hotels, livery stables, and other branch interests on railway lines; the watermen and old coasting trade by steamers; and other large classes seriously affected by similar public improvements; yet the loss of the few is the gain of the many. For these undertakings become singularly extended, and call new wants into existence, thus returning benefits a thousand fold to the community. The employed, too, are more numerous and are better paid, whilst the time and comfort of the great mass of the people, particularly the labouring classes, are incalculably enlarged, besides all being served with a cheaper and better article. Such is the practical result of monopoly, a word that has scarcely a meaning in this country now. The circumstances are changed.

As regards the millers, if *they* cry out, it will only be because they are foolish enough to pinch themselves. This Company does not seek their hurt. It earnestly desires their co-operation, and offers them licenses almost upon their own terms. Let them make common cause with us against our common competitors (for we have no enemies now) the French millers; and with cheaper fuel, improved machinery, and relief from freight and other importation expenses, it will indeed be contrary to all prior experience, if we are beaten in *any* manufacture, and on our own soil too. Despondency is ruin; exertion with Englishmen is success.

The Directors do not propose to build expensive premises, which would involve delay, and sink a large fixed capital. They have some in view to rent on more advan-

tageous terms, which will not merely make this a safe investment, but, with an immediate, and increasing demand, produce quicker returns than new railway, steam navigation, or such like companies, unprotected by patents. And the business will be conducted on this safe principle; the outlay will be progressive, proportional to the requirements of the public, so that the Directors can commence operations before all the capital be subscribed, and they will apply the receipts towards the preliminary expenses, and formation of the Company.

Acting on these principles, the capital at first anticipated will not be required. But as the operations of the Company may be largely increased, the Deed of Incorporation will provide for an increase of capital, to be raised with the consent of the majority of the shareholders, in which case they will have the option of taking the new shares.

The first call will not exceed £2 per share, nor any subsequent call £1 per share, nor be made without at least one month's notice.

A Deed will be prepared for the signature of the proprietors, conferring upon the Directors the proper and usual administrative powers for carrying out the objects of the Company, and protecting the interests of the general body of shareholders. And within two months at most from obtaining the Royal Charter or Act of Incorporation they will be called together, to receive a statement of the Company's affairs.

Forms of application for shares, and terms for Home, Foreign, and Colonial Licenses may be obtained on application to the Secretary.

By order of the Board,
B. COVENY, Secy.

Offices:—11, Great Tower-street, London,
21st August, 1851.

ENGINEER'S REPORT.

25, PARLIAMENT STREET, WESTMINSTER,
13th June, 1851.

TO THE DIRECTORS OF THE CONICAL FLOUR MILL
COMPANY.

GENTLEMEN,

Pursuant to your instructions, I have made experiments on the power required to grind wheat on the old system, and on the new principle of Mr. WESTCUP's Conical Flour Mill. The results are very satisfactory, and the details are set forth in the accompanying Appendices.*

From these experiments I draw the following conclusions in favor of the Conical Flour Mill. First, as regards the produce; Second, as regards the power required; Third, as regards the advantages.

First. The loss in grinding is less, and the produce of the more valuable portions of the wheat is increased; that is, the husk of the clavel is more thoroughly deprived of the flour by the Patent than by the ordinary method. The quality of the flour is also materially better by the Patent plan, and being stronger, it makes a greater quantity of bread.

The Conical Mill also produces a flour from some of the cheaper wheats as strong as can be obtained from many of the dear foreign wheats, which is also a source of economy.

The bran is produced perfectly open, and clean, and so much larger as to shew that it, and consequently the flour, has not been so much destroyed by constant grinding as in the ordinary process.

Second. As regards the power. The ordinary work of a pair of 4 feet French stones is $3\frac{1}{2}$ bushels per hour; and the power required is 4 horses' power.

But the Conical Flour Mill will grind nearly 7 bushels per hour, with only four horses' power, so that there is a saving of nearly one-half of the cost of the steam-power, fuel and labour usually employed; besides making a better article.

Third. As regards the advantages of the Conical Mill, independent of its economy,

* These would take too much space for insertion.

The meal leaves the stones so cool that it may be dressed at once, instead of waiting to become cool, as in the usual plan; an advantage of great value in practice.

The stones being only 2 feet 6 in diameter, and not weighing more than 6 cwt., and the ordinary pair of stones weighing 28 cwt., and being 4 feet in diameter, the new Mill is more portable for country or export Mills.

The arrangements for adjusting the relative distances of the stones from each other, are much more complete than the usual mode, admitting of a nicety hitherto unknown.

The feed likewise is on a new and improved plan; being self-acting, it is easily adjusted, and cannot stop off: and the whole gear and tackle may be much lighter than on the old plan.

It is proper to say, in conclusion, that I consider the Patent Mill was severely tested by my trying it against one of the best ordinary Mills I could find,—the Anchor Steam Flour Mills of Messrs. PAVITT, at Wapping, which are noted for their excellence. They are certainly superior to the average, and were in excellent working order; and the best pair of stones they had was chosen.

The power of the engines was taken by Indicator diagrams in the usual way, and the most scrupulous care was observed in every stage of the process.

I have the honor to remain, &c.

HENRY SMITH, C. E.

••• It has been so frequently remarked that a "saving of one-half of the cost of the steam-power, fuel, and labour," is a saving of only 50 per cent., when it is in reality 100 per cent., that it is proper to show how this large saving is effected.

On the old plan, say 20 pairs of stones require $(20 \times 4 =) 80$ HP to drive them. If the same power were applied to the Conical Mills, they would grind, by the previous report, double the quantity of wheat. Therefore, to grind the same quantity, only half the power, or $(80 \div 2 =) 40$ HP would be required. Therefore, 40 HP, with the new mills, saves 40 HP upon the old mills; equal therefore to a saving of $(\therefore 40 : 40 :: 100)$ 100 per cent.

The money saving (in fuel, labour, and interest on the greater power) is of course in the same proportion: 100 per cent.—B. C.

CERTIFICATES OF THE QUALITY OF FLOUR GROUND BY THE CONICAL MILL.

No. 1.

TO Mr. W. WESTRUP, 282, Wapping.

At your request I send you my practical opinion of the quality of your flour, I am happy to inform you I have no fault in any way whatever to find with it. I have used a great quantity of your No. 2 Households, for contract, *and it has never failed* to produce three loaves more than any other flour I have used. Your flour always works steadily in the sponge and dough, and retains its strength to the oven.

Should you form a Company to carry out your principle of grinding, I should like to have 40 or 50 Shares.

THOMAS HADDEN,
High Street, Poplar, 2nd June, 1851.

No. 2.

MR. W. WESTRUP.

The several parcels of flour I received of you were very good, strong and of good colour, but that from the Wheat you ground for me, was much better and much stronger than the flour from the same wheats ground in the usual way, and makes considerably more bread. That which you sent last, from middling red wheats, is strong and of good colour for such quality, I have made some into biscuits which are very good. *I should like all the flour I use, to be made on your principle. It is the best method of grinding I ever saw, for I am persuaded it will make good flour from second-rate wheat,* and will prove a source of profit.

S. GILLHAM,
212, Blackfriars Road, June 28th, 1851.

No. 3.

To Mr. WESTRUP.

In stating my opinion of your flour, I have only to say after using several hundred sacks during the last twelvemonths, I have always found them a very good, regular sack of flour, with plenty of colour, strength and quality, more so than any flour I have used for the last twenty years. I can speak from experience, as I have not had any of your flour this last month, and *with all that which I have been using I have not been able to produce so good a loaf, either in quantity or quality*, or that would come to the scale and keep its moisture for so long a time; the last flour I used about a month ago, I had in my hot place four months, and I found it as free and as fresh as when it came in, although I was afraid of its getting out of condition all the time, as when it came in last January it was very wet, and all the flour was quite soaked with the rain, but I should not be afraid of yours ever getting out of condition, after the proof I have had, and as I have room I will have some more.

S. W. DEVEREUX,

24, High Street, Shadwell, June 30th, 1851.

No. 4.

Mr. D. PAVITT.

I have given the flour a fair trial, and find the quantity is rather over 98 loaves per sack—not 99 quite. You will see the quality and be able to judge for yourself. I have no doubt but the quality would improve by age. As regards the quantity, it is from three to four loaves more than I am in the habit of getting from the general run of flour. I have written this, as I shall not be at home when you call to-day. I must apologise for not returning an answer to yours of Saturday last, but as I was unable to try it, was not in a position to give an opinion about it. I weigh the loaves into the oven the same as I am in the habit of doing, which is five pounds six ounces.

JOHN KINGSFORD,

Lewisham, 17th July, 1851.

No. 5.

To Mr. WESTRUP.

I have been in the trade the last twenty-two years, in one shop, and using your flour for some time. I have the pleasure to inform you that I used the last of your flour on Monday, which had been standing in my warehouse for three months, and I find it excellent and not out of condition. I have given it a fair trial, and find the quality sweet, good and very nutritious, not having the usual rankness about it, nor the color dying off, as is the case with a great quantity of the flour that comes to hand, particularly the French. We have made from yours 106 loaves, of the weight of four pounds six ounces before going to the oven.

One of the great qualities belonging to your flour, is the steady way of its working until it comes to the oven; there it shews its quality and strength, and will keep its weight and moisture longer than any flour you can use, if made well in the dough. The statement I can prove to any persons coming and seeing the working of the same, both by quality and quantity. I hope by doing justice to your flour I shall offend no parties.

J. NICHOLLS, Baker,

Gt. Union Street, Newington Causeway, June 26th, 1851.

Flour bought and tried in April, 1851.

One sack households flour.....106

Allowance for cones 4

 102*

* The average quantity is from 94 to 96 loaves per sack.

••• Attention has been called to our reduced estimate at page 7 of the capital invested in flour mills. *Blackwood* certainly makes it amount to eleven millions and a quarter; whilst an intelligent writer in the *British Corn Millers' League* observes:—"Thus was called into existence a mass of property which, it is well known, exceeds in value that employed in the cotton trade." We must leave these statements to speak for themselves simply observing that we have throughout desired rather to under than over state the facts.—B. C.

ON THE PRINCIPLE OF THE CONICAL FLOUR MILL

BY BOYMAN BOYMAN.

To appreciate the superiority of a new principle of grinding, it is necessary to understand the defects of the old.

For a pair of stones 4 feet diameter, an engine of 4-horse power, action is required. The lower stone is fixed; the upper one, weighing 14 cwt. revolves, the grinding surface working at a mean velocity of 15·184 feet per second, when the stone makes 120 revolutions per minute, the average number for this power. Through a hole of 10 inches diameter, called the eye, in the middle of this revolving stone, the wheat enters, and is drawn between the stones and ground, the stones being slightly chiselled out in lines, called dressing, to produce the grinding surfaces.

So heavy a weight, flying round at this high velocity, soon crushes the wheat, and reduces the contents to flour, when it ought immediately to escape, but cannot; so large is the area of the stones, so great is the pressure of the top stone, and so clogged up do they become by the sticky meal having to travel so far. Thus, from the instant that the meal is retained beyond the time required to grind it, deterioration commences, and power begins to be uselessly consumed in getting it out of the way, which it can only do very slowly; for every particle must describe a volute, with minute but gradually enlarging circles, until it gets to the edge, or skirt, of the stone, and is discharged. And were the co-efficient of friction resistance to the centrifugal velocity ascertained, the actual distance the meal is subjected to this grinding action could be determined. But it must be very great, circling round a stone of 4 feet diameter, the friction resistance of an adhesive substance like meal to the centrifugal action, is so considerable. It is thus easy to see how some portion of the bread-making properties of the flour must be destroyed by so much unnecessary trituration, and how much power must be consumed in getting rid of a material so retarding as meal, beyond that required merely to grind the wheat.

The CONICAL MILL obviates these defects to as great an extent as is practicable, because it is the nearest approach to natural mechanics, and the more closely man imitates those mechanical principles which the Great Mechanic thought best adapted for the purpose, when He made animate machines, the nearer is absolute perfection reached. For we may

be very sure that there must be excellent reasons why His contrivances are best, though we fail to discover them. We can see, however, with what admirable economy of power the jaws of the horse are contrived to grind his corn. The heavy, head-bearing, upper jaw is fixed, the lower one moves, and being of little weight, requires but little power to move it. It is also an upward pressure, so that no weight rests upon the corn, as in the present erroneous system. Its pressure, therefore, is exactly proportioned to the work it has to do, and no more; whilst the lower grinders, with their serrated edges, may be likened to little mill-stones of small surface, which, with a semi-rotary motion, reduce the corn to meal. Designedly or not, the Conical Mill is on precisely the same principles throughout. The upper stone is fixed, the lower one revolves, and instead of being 14 cwt., like the upper revolving stone of the present mills, is only 1 cwt. 2 qrs. Thus the upward pressure is as nicely proportioned as the horse's jaw, sufficient only to open, not to crush, the corn. It is too of small surface, like the grinders of the horse, and set at an angle not many degrees removed from that of the horse's jaws.

These natural principles of grinding, Mr. WESTRUP has very ingeniously carried out. Instead of having one small conical surface, whereby some of the meal would be re-ground, and the stones become clogged, though not to the same extent as on the old principle, he divides even this smaller surface into two, by having two pairs of conical stones on the same shaft, the lower pair about 2 feet 3 inches beneath the upper, so that each surface is only as 1 to 3 $\frac{1}{4}$ of the old. And to prevent any portion being re-ground, the first object to be avoided in good milling, there are vertical brushes fixed to the shaft, between the two pairs of stones, extending to a radius of 14 or 15 inches, and nearly touching a fine-meshed cylinder that surrounds the whole mill. No sooner then is the fine flour liberated from the upper stones, than it is sent through the cylinder by these revolving brushes, whilst all that will not go through has not been sufficiently ground, and so passes down into the second pair of stones, which complete the process.

At length then the true principle of grinding has been discovered; the means of getting what it has been the great object of the best millers to get—as much of the very best and whitest flour possible at the first grinding, and to get it as soon as possible; that is, the moment the wheat has been opened and the farina liberated, which is done soon after the wheat enters the eye. But, as we have seen, this object never can be accomplished whilst the flour has to travel round and round a 4 feet stone. Every miller then will see what a superior flour must be obtained from a stone whose grinding surface is only 3.5986 feet, and which delivers its flour at a mean velocity of 21.833 feet per second, as compared to that which has to pass over a grinding surface of 12.021 feet, and which is only delivered at a mean velocity of

15'184 feet per second. The smallest possible surface, the quickest possible delivery consistent with coolness, and the greatest possible quantity, ground at the first casting, and with the smallest power, constitute the great principles of milling; and here they are all combined.

It is gratifying to find that all the results of the French practice are reached in this country, so far as regards the quality of the flour obtained from the first casting or grinding; whilst it is greatly surpassed as regards quantity ground by a given power in a given time; and also in the money value of the total produce from a given quantity of wheat, the first cost of the wheat being the same. Thus the Conical Mill will do all it is possible for the best French mill to do, and a great deal the best French mill cannot do. It will give quantity as well as quality. The French mill will only give quality. The French miller takes care to give his mills only the exact quantity of wheat he can grind, that the first operation may be well done; and this quantity is about one-half less than even the common English mills, of the same size of stones, grind in the same time; and only by this slow process can the French millers get that fine white flour, so pleasing to the eye in the best Parisian bread, called "*Farine de Gruaux*." But this tedious grinding would not be done in England, where time, the measure of labour, is money. It will not do for a people who, of all the peopled earth, know best how to do the most work in the least time; and who live, for all practical purposes, measured by the useful work done, twice as long as any other race. And what the French do themselves they make their machines do. With us every invention is a mere pounds, shillings, and pence affair. What will it do? and what does it cost in doing it? So that quantity is as essential as quality. Thus the inventor of the Conical Mill does precisely what the French miller does, only by a better, because more time-saving, economical system. As a practical miller, he knew the importance of preventing re-grinding; but instead of reducing the quantity of wheat to prevent it, he reduces the surface of the stones, removes all injurious pressure, gives them a different shape, and a higher velocity; and thus he gets as good a flour as the French miller, whilst he grinds three or four times as much in the same time, and, by the Engineer's Report, nearly twice as much as the ordinary English mill. Such then is the difference between the two systems of milling, from which it will be seen that we still preserve our twenty years' advance of our neighbours in this art, as we believe we do in most of the great substantialities of life that make up the solid greatness and prosperity of a nation.

As regards the ability to grind nearly double the quantity of wheat with the same power, the solution will be found in the area of each grinding surface, the conical surface being as only 1 to 3'34 of the horizontal stone, a reduction that can only be obtained by the peculiar form of the stones. The result is an area so much smaller is, as before alluded to, a very remarkable saving

in power, arising from the great decrease of the resistance of so adhesive a substance as meal over so large an area as the old stone, between such rough and close surfaces, and beneath so heavy a pressure. Were the co-efficients of this resistance known, a theoretical investigation might be given of the saving of power; but without such data the mathematician will best understand how impossible it is to go into this question.

By analogy, however, some idea may be formed of how great this loss must be from the fact, that the friction of water through a pipe only six times as long as it is wide, consumes $(\cdot 01482 + \frac{\cdot 017963}{\sqrt{v}}) \frac{l}{d} \cdot \frac{v^2}{2g} = 11\cdot 4$

per cent. (Weisbach, vol. 1, sec. 330 and 331.) And were the pipe made of wood, the co-efficient of resistance would be 1·75 times more than for smooth metallic pipes, whence we see how much greater still the loss must be with a sticky material like meal, and passing through rough stones, where, probably, the loss would be, not merely as $\frac{l}{d}$, but as $\frac{l^2}{d}$, or $\left(\frac{l}{d}\right)^2$; be-

cause its particles do not momentarily communicate equal pressure in all directions, like water, and so get out of the way by an equal pressure throughout its mass. For the further the meal has to be forced between such very rough surfaces, (so closely pressed too as not to exceed the thickness of ordinary writing paper) the more compressed and unyielding must it become; therefore the greater must be the resistance to motion, encreasing (doubtless) at least as the square of the distance, and requiring proportional power to get rid of it. When therefore the surface passed over is reduced in the proportion of 1 to 3·34, it is easy to perceive how great the saving must be; because the meal being got rid of with the new stones as soon as it is ground, and the space between the stones being wider, that power, which, with the old stones, is consumed in forcing it from between the stones, and in re-grinding it, goes to grind the fresh wheat.

We have seen by the Engineer's Report, that the saving in power is nearly equal to one-half. This, it must be confessed, is a large and remarkable saving in the manufacture of an article of such universal consumption as flour, the raw material of which costs upwards of forty millions sterling a-year, besides making it better and more productive. Independently of Watt's separate condenser, (now about three quarters of a century since it was invented, and which saved as much as three-fourths of the fuel,) there has not been in the whole history of inventions more than three or four improvements in the useful arts, which have effected at one bound so large a saving as the Conical Flour Mill. For besides the saving in fuel, it has been stated at page 10 that it is capable of encreasing the bread of the people to the value of £2,460,428 a year, which, at 6d. per loaf, would give them 4185,120 more quartern loaves a-year.

As regards the old system, numerous attempts have been made to remove the evils of horizontal stones, but they have all been in the wrong direction. For all the alterations in the world will never make a bad principle a good one. A stream of air, for instance, has been forced through the stones to relieve them of the meal, and this certainly does so to some extent. But then the air must be at great pressure to be forced through such close and rough surfaces with sufficient force and rapidity to push the cloggy meal away in time for the fresh wheat. And this must consume considerable power, while the evils of the large surface, and the great weight and pressure still remain, sufficiently shown by their wasting (according to the estimate at page 10) upwards of two millions worth of flour a year in grinding. In the cold air draught in the Conical Mill is not generated at sufficient pressure to relieve the stones of the meal, for their remarkably small depth, (or $7\frac{1}{2}$ inches,) and proportional velocity, combine to get rid of the meal quite fast enough. This is a combination of great excellence. For were the grinding surface less, it would not retain the wheat long enough to complete the process at the first grinding; and were the surface more, it would retain the wheat too long, and then re-grind it, and consume power uselessly. Whence we may safely conclude, that we have reached a principle of grinding that will give the maximum useful effect; and that in due course of time the Conical Mill will be the one grinding machine for the bread of all civilized nations, particularly valuable where wheat is scarce, and fuel dear.

FORM OF APPLICATION FOR SHARES.

TO THE DIRECTORS OF THE CONICAL FLOUR MILL COMPANY.

CAPITAL £100,000, (WITH POWER TO INCREASE,) IN 10,000 SHARES OF £10 EACH.

Gentlemen,

I request you will allot me _____ Shares in the above Company, pursuant to your Prospectus of the 21st of August 1851, and I undertake to pay the Deposit of 1s. per Share on such number of shares you may allot to me, and sign the proper Deeds when required.

Name in full _____

Address _____

Occupation _____

Date _____

Reference _____

COMPARATIVE COST of erecting Steam Flour Mills on the Old and New Principle. We will take ten pairs of 4-foot stones at London Prices :—

OLD PRINCIPLE.

Ten pairs of Stones, with hurst and gearing complete, at £150	£1500	0	0
Connecting Machinery to ditto.....	400	0	0
Forty horse-power Double Cylinder Engine, at £50	2000	0	0

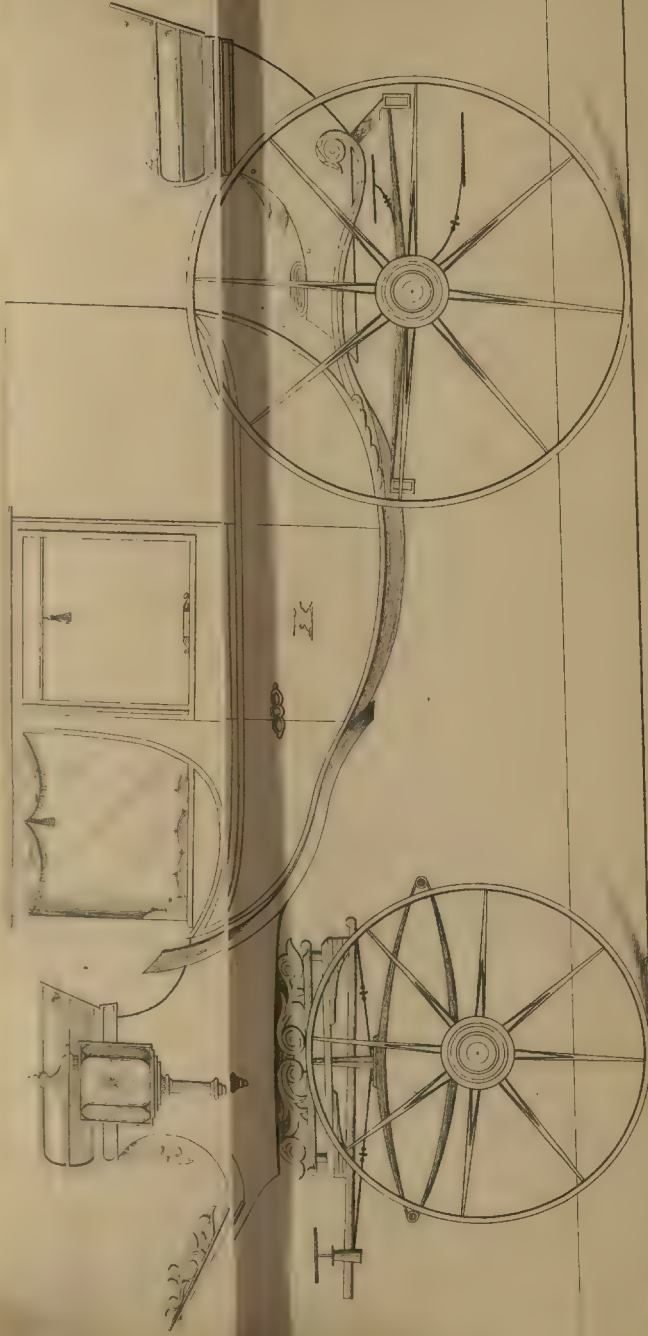
£3900	0	0
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NEW PRINCIPLE.

If the Conical Mill save only four tenths of the power, six mills will do the work of ten, and six mills at £250	£1500	0	0
Connecting Machinery	300	0	0
Twenty-four horse-power Engine, double cylinder, at £50	1200	0	0
Balance saved in first cost.....	900	0	0

£3900	0	0
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We find therefore a saving of £900 upon only ten pairs of stones on the old principle, independent of the saving in interest, fuel, stoker, and repairs, amounting to a considerable sum per annum, besides making a better and more productive article.



THE DIORPHA OR TWO HEADED CARRIAGE.

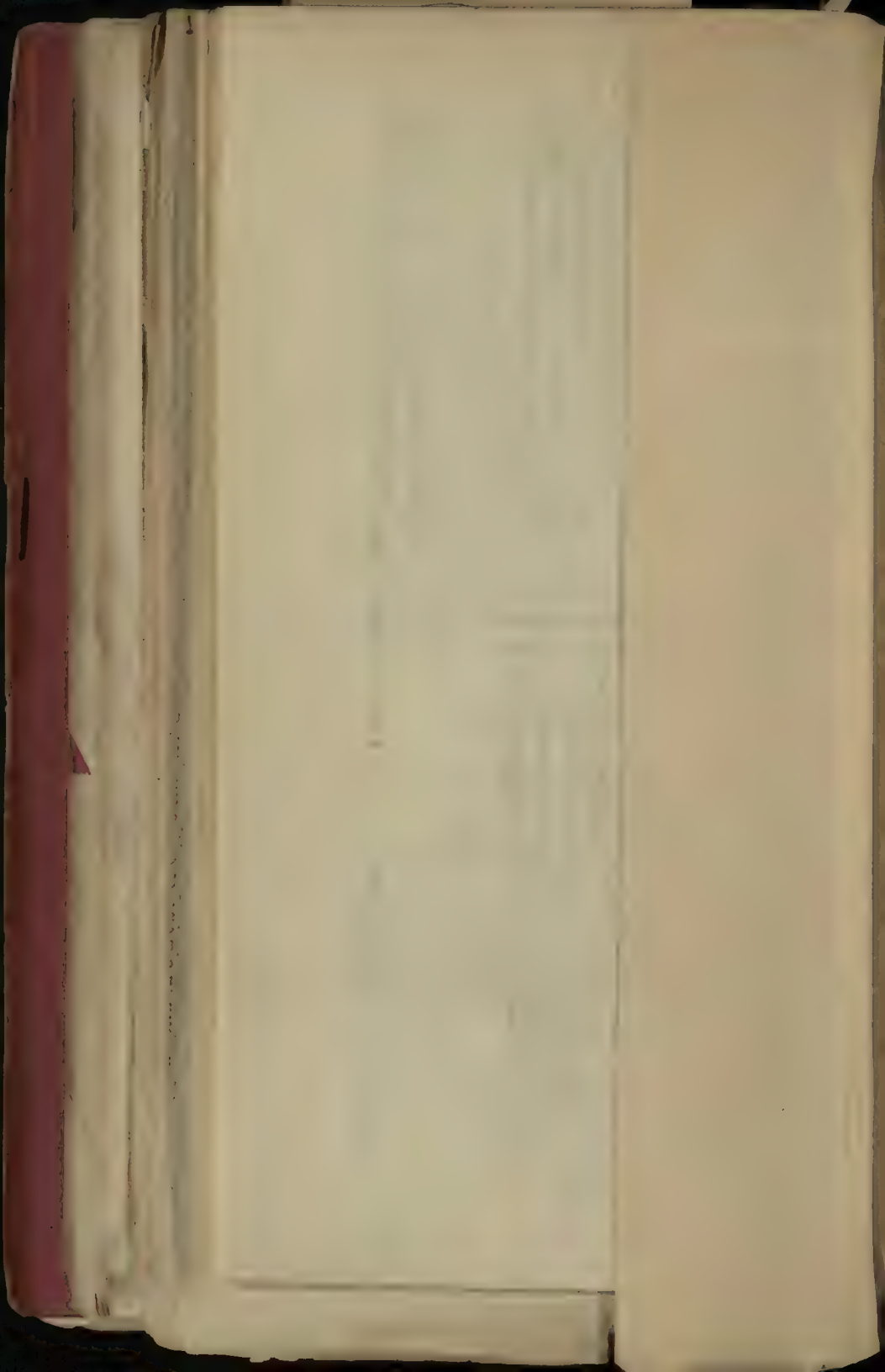
Which forms a perfect Clarence and Barouche, Registered according to Act 6 & 7 Vict. Chap. 65.

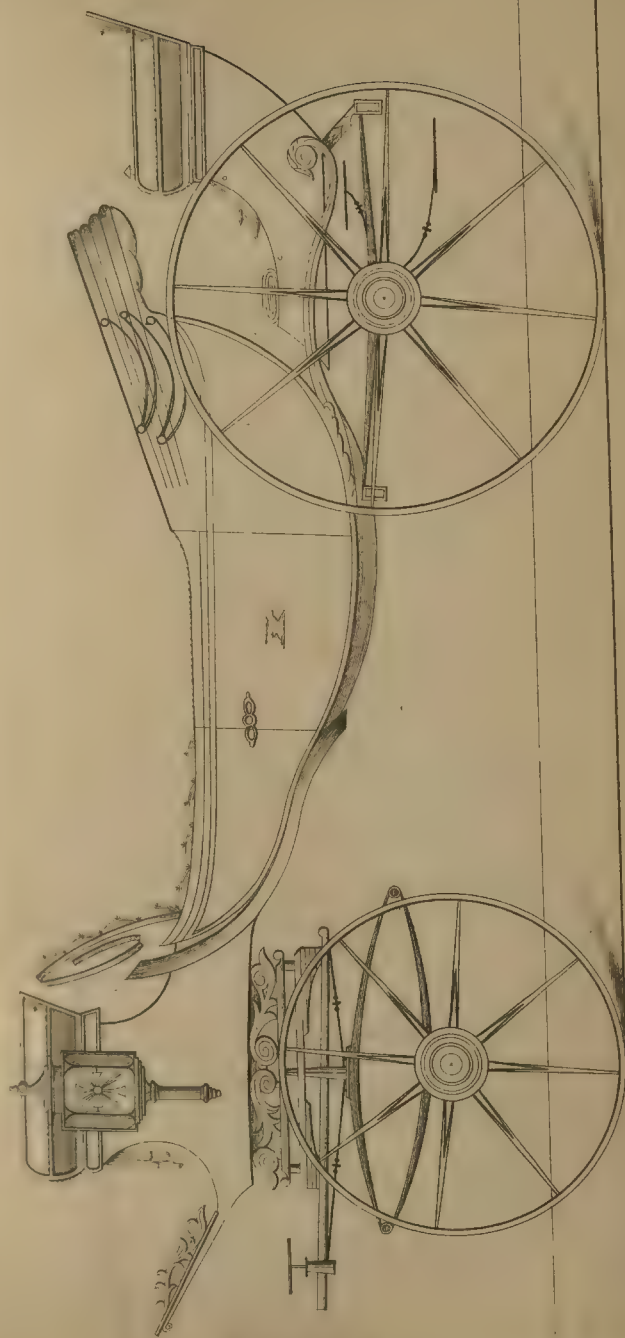
FROM

CORBEN & SONS.

COACH BUILDERS.

GREAT QUEEN STREET, LINCOLNS INN FIELDS, LONDON.





THE DIORPHA OR TWO HEADED CARRIAGE.

Which forms a perfect Clarence and Barouche, Registered according to Act C&T 1857 cap 65.

FROM

CORBEN & SONS.

COACH BUILDERS.

GREAT QUEEN STREET, LINCOLNS INN FIELDS, LONDON.

of No. 31, Great Queen Street, London.

Exhibit the "Diocophæ" or two headed Carriage which is registered with their lever key fastenings and various improvements on the original design: the intention is to combine the open & close Carriage in one in the most perfect manner possible; for this purpose a folding or Phaton head is fixed by the simple lever keys to the lower or Barouche Body forming a perfect Barouche; and when the Phaton head is removed a Clarence head is substituted which covers the whole of the Body rendering it a close Carriage, at the juncture are double rebates which make it impervious to wind and water, to this head are fixed 4 tapered spikes for the purpose of guiding the head into its place and the above mentioned keys enter mortices in their sides holding them securely: the glaziers are made to slide, and every thing to act and appear the same as if the carriage was originally made either open or close permanently & without the slightest interference with the style or shape; the Carriage may be made of almost any pattern. It is rendered more complete by the simple means used to raise the Clarence head which otherwise would be beyond the power of one man to accomplish an attachment is made by a cord to the roof or sides of the head eyes being fixed for the purpose, a pulley is fixed to the centre of the curb thus acting and are thus in one corner over which the cord passes having at this further end a balance weight attached and by the aid of which the head is raised or lowered easily.

October. 1854.

CUNNINGHAM AND CARTER'S
NEW SYSTEM OF PROPELLING CARRIAGES ON RAILWAYS.

Series.

CUNNINGHAM AND CARTER'S NEW SYSTEM OF PROPELLING CARRIAGES ON RAILWAYS.

[Extracted from "The Journal of the Exhibition," to the formation of trains in a terminal is easily per-

formed by means of a rope, which, being attached to the carriage to be moved, or a train to be taken out of a siding, is then made fast to the capstan head, in which every central upright shaft terminates; and the starting valve being moved by pressing on the tappet, the carriages proceed in the direction of the impulse, guided by the situation of the points. Branch lines, no matter how numerous they may be, will not, under this arrangement, occasion to the trunk line an expenditure any way proportioned to the case at present; but with the additional length of tube, and corresponding air-engines, wheels, &c., will yield to the company profit, and to the public the accommodation which they now derive at a greater outlay.

The daily expense of working a double line of fifty miles in length, during a period of ten hours, the trains running from each terminus every half hour, and six being always in motion, will consist—first, in the cost of coals for five stationary engines of 100-horse power, which being taken at 5*l.* per horse power, amounts to eleven tons, at 10*s.* per ton, or 5*l.* 10*s.*; wages for engine-men, stokers, cleaners, drivers, and guards, and men stationed along the line, will amount to 6*l.* 2*s.* 6*d.*; oil, &c. for the air engines, 3*l.*; together, 14*l.* 12*s.* 6*d.*; to which must be added the estimated daily amount of depreciation, 11*l.*; being in the whole 25*l.* 12*s.* 6*d.*; say forty trains, at 3*d.* per train per mile.

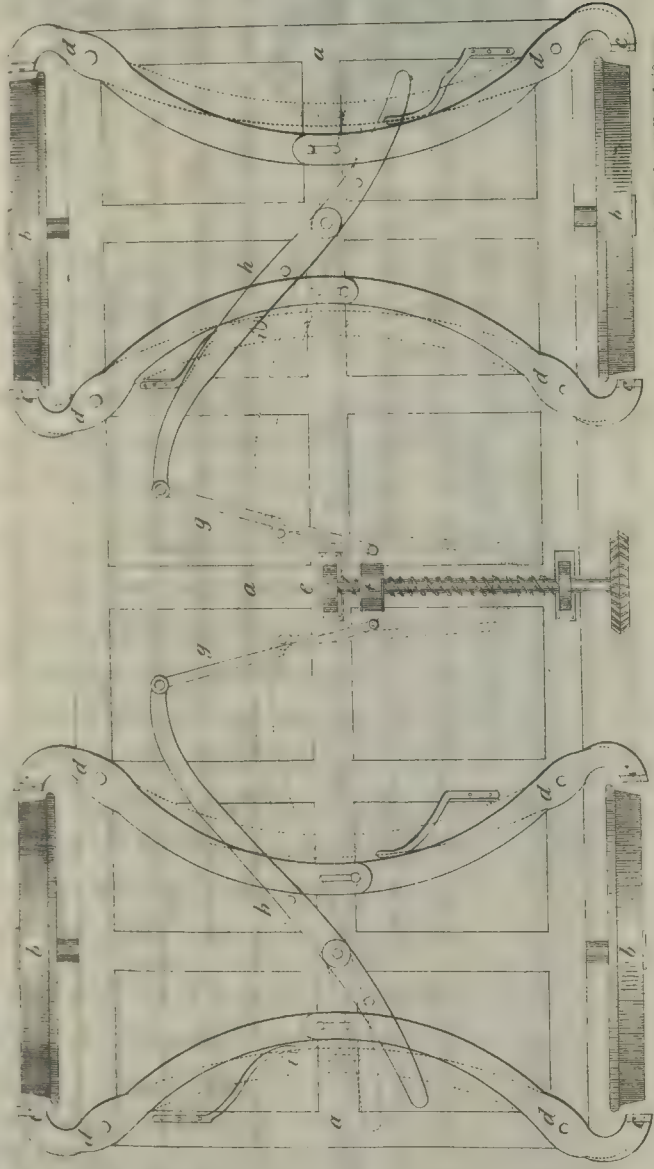
The estimate of the cost of constructing a double line of railway, and fixing the machinery for this system is, per mile, for stationary steam engines and air pumps, 500*l.*; air engines and propelling wheels, say fourteen sets, at 200*l.* per set, 2,800*l.*; iron pipe, ten inches in diameter, 700*l.*; together, 4,000*l.* per mile, exclusive of the rails and roadway.

In several of the details of the working expenses, the economy of the system will be obvious at first sight. With respect to the fuel, we have expensive coke in the locomotive system, exposed to the constant action of a strong blast of air, which, from its extreme rapidity and force, carries a large portion of the hot products of combustion up the funnel before it can have time to communicate its heat to the water in the boiler. In this system, we have low priced coal, acting with the advantage which it can derive from the improvements devised by science for the economy of heat in stationary steam engines. Then, also, a few houses, containing the stationary engines, conducted by moderate establishments, and supplying an amount of power sufficient to meet the utmost demands of every exigency of railway traffic, must necessarily incur a much smaller expense than a large number of engines, with the necessary establishments for their continual construction and repair. In point of mechanical superiority, this invention possesses several important advantages. The very weight of the locomotive engine, which is essential to confer a tractive power upon it, occasions the necessity for proportionally increasing its strength, and that also of the rails and roads upon which it moves, together with the cost of maintenance of each. All these items must necessarily be much greater than they would be on a line laid down on this system, where the weight of the carriages *only* would be sustained. The rapid destruction of moving engines, from the high velocities at which they are driven, together with the constant injury to roads and rails, involve a large amount of expenditure, in comparison with the wear and tear under the proposed circumstances. If the interest of railway shareholders be considered, they will find a system of extravagant and continual outlay on the one hand, and on the other, one of rigid economy, capable of indefinite extension, and exchanging a system of monster trains succeeding each other at long intervals, with frequent accidents, involving loss of life and limb, for a system of perfect safety, great economy, and the convenience of a rapid succession of small trains, succeeding each other at short intervals.

The great economy of the system about to be described arises from the peculiarity of the principle on which it communicates motion to trains of carriages, as also to several other points of peculiarity which are the natural consequences of the method proposed by the inventors. On this system no change is contemplated in the construction of the road, or the placing of the rails, and, therefore, it may be applied with ease to any line already existing.

At intervals of about the fourteenth of a mile, varied in practice according to the gradients and curves, the road is intersected by transverse rectangular trenches, in each of which a case or chest is firmly bedded. The chest is of iron, and made in sections, which may be easily bolted one to another. Within the chest are placed three vertical axles, their summits being above the rails, carrying horizontal driving wheels, one of which is placed midway between the two tramways, and one on each bank outside the rails. Immediately adjoining are a pair of air engines, the pistons of which act by means of a crank rod and pin on the exterior driving wheels, and these are set in motion by the train itself, in the following manner:—Along the entire length of the railroad, and on the outside of one of the trams, beneath the surface of the ground, is laid an iron tube or main of about ten inches in diameter, its surface being everywhere practically air tight, and which, in practice, would be made of thin sheet iron, corrugated in a rolling machine, and closed. This tube is partially exhausted of its air by stationary steam engines, constantly working, each of which is capable of maintaining a partial vacuum of the given pressure in a section of the tube ten miles in length. Branch pipes lead from the exhausting main to the air engines, and in chambers connected with these are placed two valves, the one called a "starting valve," the other a "reversing valve." They stand immediately below the extremities of a curved lever of the first kind firmly suspended beneath that part of the roof of the chest which is comprehended between the rails. The lever may be made to revolve slightly out of its position of rest, by moving either of two "tappets" which work above ground, immediately over its ends. The train being provided on both sides with "traction rails" at the level of the peripheries of the driving wheels, moves along the rails until it enters the rove of a pair of them. At that moment an inverted inclined plane, the inclination of which may be regulated from within, moves over the tappet near the starting valve, which, being opened, communication takes place between the air engines and the exhausting main, and the driving wheels are set in motion. The traction rails above alluded to may be dispensed or contracted by the adjustment of the telescopic bars which connect them, and are thus grasped by the driving wheels with a force proportioned to the velocity required. The train is immediately impelled forward by the reaction of the wheels upon the side rails, which have received the name of "traction rails" from an analogy between the effort of the wheel upon them, in this case, and the effort of the driving wheel upon the rail, in the case of the locomotive. It may, indeed, be said, that the two processes are reciprocal, or each is, as it were, the converse of the other; for whereas, in the locomotive system, the motion is occasioned by an effort from within the train upon a fixed obstacle, in this system it is more advantageously created by an effort from without upon a moveable resistance. In both, however, the motion is due to the forcible and successive application of every point of a circle, to a corresponding point of a straight line equally distant from any one point of contact.

The above being a succinct and cursory description of this machinery, the following is a short detail of its principal advantages, and of its sources of economy:—In the first place, it possesses all the advantages of the locomotive system as regards crossings and sidings, and still greater ones wherever branches, deviations, or gradients are concerned. All the business incidental



David Davies respectfully solicits the attention of Railway Boards to his Improved Breaks for Railway Carriages, as highly conducive to the comfort and safety of passengers.

It has been proved that sufficient attention has not hitherto been paid to the subject of Breaks: that the greater number of those now in use are objectionable and ill adapted for the purpose they are intended to serve. A recent writer on Railway matters, alluding to the Breaks, speaks of them "as among the most imperfect of the mechanical details." To the unworthiness of the present Breaks may, probably, be assigned the little importance that has hitherto been attached to their employment.

David Davies begs to state that he has perfected a Break for Railway Carriages, greatly superior to those in common use, and which on its first announcement, was noticed in terms of the highest commendation. By the "Railway Times," "The Civil Engineer and Architects Journal," and other scientific periodicals. This favorable opinion has since been fully borne out by the satisfactory working of six of Davies' Breaks on the London & Birmingham Railway, where they have been in successful operation for some time past. The result of this ordeal has been to demonstrate that Davies' Break is superior to every other in the important matters of Power, — facility of application, — efficiency of action, — and Safety and Comfort of Travellers.

As regards power, a small section on the part of the Guard suffices to stop all four wheels of a Carriage - while at the same time, firm the wheels being held upon the two opposite sides of their circumference, there is no tendency to strain or break the axles.

The flexibility of Application is such, that a few turns of a small handle brings all the breaks. (Eight in number), into silent but effectual action. When once applied to the wheels, Davies' Breaks has no tendency to fly off, but continues in action until released by turning the handle in the reverse direction.

The comfort of these Breaks is equal to their safety, their action being wholly silent and imperceptible to the ear, they may be used upon fast Class Carriages without being any annoyance, as the Passengers will not at any time be conscious of their application.

The Construction of these Breaks as well as the principle of their Action, are fully explained by the Engraving prefixed to this Circular, and by the following description, extracted from the "Railway Times".

"A, represents the under side of the framing of a railway Carriage, B, b, are the four wheels, c, c, are breaks on the extremities of eight long levers, whose fulcrum is at a, c, c, is a shaft carrying a quick threaded screw, working in fixed bearings, furnished with a screw wheel, e, for connecting it with a vertical shaft and handle, led off to any point at which it may be convenient for the Breaksman to be stationed, f, is a travelling nut, attached by the connecting rods g, g, to the two screw levers h, h. There are two notices in each of the screw levers, through which the break levers pass, these levers are connected by a pin on the extremity of one lever sliding in a slot in an iron plate on the end of that opposite to it, so that any motion conveyed to the one, is simultaneously communicated to the other, i, i, are four springs which keep the breaks off from the wheels until acted upon by the levers. The following given to the screw e, the travelling nut f, is drawn towards the front wheel, which causes the several levers to assume the position shown by the dotted lines, which will occasion the breaks c, c, to press against the circumference of all four of the wheels with immense force, preventing their rotation and converting the carriage into a perfect sledges.

David Davies, Inventor of the Silent, Silent, and other favorite

Break Carriages.

15, Wigmore Street, Cavendish Square, London. -

Patentee of the
ATHIKTOBATHRON



or the Ladies'
CARRIAGE STEPS.

DAVID DAVIES & SON beg respectfully to invite the Nobility and Gentry to view their NEW PATENT STEPS FOR CARRIAGES, which they have recently introduced. These Steps differ from all others that have ever yet been used: when not in use they are deposited in so small a space underneath the Carriage, that they do not interfere with the outlines of the body, as is the case in all other external Steps, which have always an unsightly appearance, and are a great objection in intersecting the lines of the body.

D. D. & SON have overcome the great difficulties in their Patent Steps, which has never yet been accomplished in so complete a manner. The principal features in their Improvements are novel and perfect in construction: when in use, they possess all the advantages of the Inside Chariot Steps, being lined with Leather and Carpet, perfectly free from dirt. They can be adapted to any class of Carriage; and are attached to the Door with a most simple contrivance, yet so secure, that when the Doors are opened the Steps are in immediate use, and by closing them the Steps resume their hiding place. They are applicable to high or low Carriages, and can be extended from one or more treads as may be required, making the access easy for Ladies. The merits of this invention can be better appreciated by seeing them in actual work than by any description on paper.

DAVID DAVIES & SON beg most respectfully to acknowledge the kind patronage they have received on former occasions from the Nobility and Gentry, in their several Inventions on Carriages; it having for years been their study to improve the Draught of Carriages, in which they have effectually succeeded. They have now on view Carriages fitted up with their Patent Steps, and Testimonials from those Gentlemen who have them in use; and will feel honored by their calling to inspect them, at their Manufactory for Improvements on Carriages, No. 15, WIGMORE STREET, CAVENDISH SQUARE.

TESTIMONIALS.

*Gronant, near Holywell,
November 3rd, 1848.*

SIR,—I am much pleased with the Patent Steps which are fixed to the Carriage you built for me last Spring: they are so simple, and cannot go out of order. The invention is quite new to us in Wales, and universally admired; wherever I go there seems a general examination of the Patent Steps.

I have no doubt they will soon be required to every Carriage.

I am, Sir,
Your obedient Servant,
JOHN DAWSON.

Mr. DAVIES, *Coach Builder*,
15, Wigmore Street, Cavendish Square.

*Frogneil Hall, Hampstead,
October 26th, 1848.*

SIR,—In reply to your letter of the 24th instant, I beg to inform you that the Patent Steps you put to my Brougham last year answers very well; they are strong, do not get out of order, and quite answers the object in view.

Your obedient Servant,
F. C. SMITH.

Mr. DAVIES, *Coachmaker*,
15, Wigmore Street.

24th October, 1848.

Mr. D. DAVIES,

SIR,—In reply to yours of the 23rd instant, wishing to have my opinion of the Patent Steps you fixed on the Carriage you built for me, I have much pleasure in complying, as I am fully enabled to bear ample testimony to their efficiency.

The Carriage has been, I may almost say, in daily use since I have had it (now one year), and with but very indifferent roads, and it has in no respect given way, but looks as well and answers as well as when I first began to use it.

The Step, as well as the Carriage, has been much admired.

I am, Sir,
Your obedient Servant,
GEORGE JENNINGS.

*11, Regent Street, Pall Mall,
25th October, 1848.*

Mr. DAVIES' Patent Steps were applied to my Carriage a year ago, and having been constantly in use, have never been out of order, or required any repair; in fact they are less liable to injury than any other kind of Steps that are protected from the mud, and are much more convenient. They do the greatest credit to the ingenuity of Mr. DAVIES; and I shall be happy to say anything more in their praise, if it should be desired.

J. CONINGHAM.

*5, Upper George Street, Portman Square,
October 26th, 1848.*

SIR,—In reply to yours of the 24th instant, wishing to know my opinion of the Patent Steps you fixed on my Carriage, I have much pleasure in saying that since they have been put on, they have been in constant use; have never given way, or been out of order; and I am quite pleased with them.

I am,
Your obedient Servant,
JOHN CHANDLER.

Mr. DAVIES, 15, Wigmore Street, Cavendish Square.

*Shenton Hall, Hinckley,
October 26th, 1848.*

SIR,—In answer to your letter received this morning, respecting the Patent Steps to my Brougham Carriage, that you built for me some months since, I have no objection to state, that they are a great improvement on the Common Steps, and also that they are not likely to be out of order. I have therefore the pleasure to sign my testimony to the above opinion.

JOHN WM. WOLLASTON.

Mr. DAVIES, 15, Wigmore Street.

Muswell Hill,

26th October, 1848.

SIR,—The Patent Steps to the Carriage I had of you, I am very much pleased with, and I consider them the most decided improvement I have known, especially as they do not appear likely to get out of order.

I am,
Your obedient Servant,
SAMUEL RIDLEY.

MR. D. DAVIES, 15, Wigmore Street.

12, Westbourne Place, Eaton Square,

November 23rd, 1848.

SIR,—Agreeable to your request I send you my opinion of the Double Patent Steps you fixed to my Carriage, they have been in use some months and have never failed; they are simple in their construction, and I find them easy to shut with the door, perfectly free from dirt. I have no hesitation in giving you my unqualified approbation of them.

L. A. PARRY.

Brampton Brean, Ludlow.

18th November, 1849.

SIR,—Although I felt reluctant to adopt the Self-acting Steps which you recommended to me in the Spring of last year, I am happy to tell you that they have acted in the most perfect manner, never having been out of order, although in constant use upwards of eighteen months.

Mrs EDWARDS has found it a great comfort, in consequence of the facility with which she can alight from her Carriage, or re-enter without any extra Servant, or any necessity for the Coachman to leave the driving box. I confess that the contrivance has been a great advantage to me, and feel assured it will soon become general.

I am,
Yours respectfully,
JOHN EDWARDS.

MR. DAVIES, 15, Wigmore Street, London.

London, January 30th, 1851.

I have used MR. DAVIES' Patent Steps applied to my Brougham, which was built by another Coachmaker, and am perfectly satisfied with them in every respect.

AUGUSTUS BARRINGTON.

123, Park Street, Grosvenor Square.

May 22nd, 1851.

MR. DAVID DAVIES,—I have used your Patent Steps three years, and cannot speak too favorably as to their convenience in every respect.

ROBERT FERGUSON, M.D.

Brook Street,

23rd May, 1851.

SIR,—I am very much pleased with the admirable contrivance of your Patent Steps, and can testify to the simplicity of their action.

I consider their addition to my Carriage a very great improvement.

I am, Sir,
Yours faithfully,
A. TWEEDIE, M.D.

MR. DAVIES, 15, Wigmore Street.

HIPPÉ DELONGUELL

CARROSSIER

Rue Royale. L' Honorable
Magasin rue du Faub^g St. Honoré, 28.
et rue Bayard 24. (Champs Elysées.)

P A R I S .

FOUR-HORSE IMPROVED PORTABLE ENGINE.

These Engines having **DIRECT ACTION**, together with the *fewest* number of working parts, and great amount of heating surface in combination with strength of construction, are at once safe and economical. They are fitted with the safety apparatus for preventing boiler explosions, for which the **SOCIETY OF ARTS**, after a rigid investigation, awarded to **I. DODDS** their large **SILVER MEDAL**.

Being worked very expansively, the consumption of coke is about 3cwt. for 10 working hours, and the Engines having been made by **Dodds and Son**, since 1841, they can be confidently recommended from experience.

The application of the crank for the motion of the valve, which is employed in these Engines, was very much approved of by the late **GEORGE STEPHENSON, Esq.**, and it has proved eminently successful in practice.

FOR PRICES AND PARTICULARS, APPLY TO

DODDS & SON,

**HOLMES ENGINE AND RAILWAY WORKS,
ROTHERHAM;**

Or to **T. WRIGHT & Co., 9, George-yard, Lombard-street,
LONDON:**

And likewise for the following articles, which will be found to be of the best finish :—

Locomotive and other Engines.
Dodds' Patent Wedge Expansive Motion for Locomotives.
Agricultural Implements.
Wrought and Cast Iron Girders.
Dodds' Improved Railway Bar Straightners.
Turntables.
Points and Crossings.
Wheels and Axles.
Jessop's Patent Steeled Railway Wheel Tyres.
Baillie's Patent Volute Springs for Railway Carriages.
Buffers and Draw Springs.
Castings and Machinery of every description made to drawings or order.

IMPROVED PORTABLE ENGINE

THE PORTABLE ENGINE is a most valuable and useful machine, and is well adapted for use in the field, for the purpose of pumping water, or for other purposes. It is a simple and easy machine to use, and is well adapted for use in the field, for the purpose of pumping water, or for other purposes. It is a simple and easy machine to use, and is well adapted for use in the field, for the purpose of pumping water, or for other purposes.

WILLIAM & SON

WILLIAM & SON, ENGINEERS, 10, ABchurch Lane, LONDON, E.C. 4. The above is a list of the names of the persons who have been appointed to the office of the company, and who are now acting as the agents of the company in the various parts of the world. The names of the persons who have been appointed to the office of the company, and who are now acting as the agents of the company in the various parts of the world.

THE PORTABLE ENGINE is a most valuable and useful machine, and is well adapted for use in the field, for the purpose of pumping water, or for other purposes. It is a simple and easy machine to use, and is well adapted for use in the field, for the purpose of pumping water, or for other purposes. It is a simple and easy machine to use, and is well adapted for use in the field, for the purpose of pumping water, or for other purposes.

PROPRIETORS OF WAGGONS, CARTS, VANS, AND CARRIAGES,

OF EVERY DESCRIPTION.

J. DRABBLE & CO.,

Inventors and London Manufacturers of

DRABBLE'S PATENT CONICAL ARMS & AXLETREES,

8, PANCRAS LANE, BUCKLERSBURY, CITY,

LONDON,

Beg to call attention to their PATENT CONICAL ARMS and AXLETREES, which has given the greatest satisfaction to all who have tried them for the *last thirty years*—so universally known to be superior to any Maker in England—an improvement in the Box has been made for better securing the oil, one supply being sufficient for *six months*. The method of their Case-hardening by Chemical Process, (only known to themselves) renders the Box and Arm so intensely hard that they are *impervious to wear*, thus keeping the Arm and Box in a state of lubrication; doing away altogether with friction, consequently reducing the draught at least *one horse in four*, and warranted for *ten years*. The Price of them is a trifle more than the common ones—but, taking into consideration the advantages to be derived by reduction of draught, saving of time, and *expense of greasing*—cannot be an object. In proof of the above assertion, J. D. & Co. will enter into agreement to take them back and return the cost of them after *twelve months' trial if not approved of*.

J. D. & Co. further beg to caution parties requiring PATENT ARMS and AXLETREES, against imitations of their make, made at Birmingham and other places from moulds, inferior iron, and soft boxes, causing friction, increasing draught, and will not stand their work, thereby incurring much trouble and expense; are sold by Agents at Iron Yards at a much greater price than charged by DRABBLE & Co. the *Inventors and London Manufacturers—made by them from the best Bar Iron Faggotted, to carry their own Oil for six months, reducing the draught one horse in four, and warranted for ten years.*

Many thousands are now in use, and can be strongly recommended by Parties who have had them at work from ten to twenty years.

J. D. & Co. will remove the Common Arms and Axletrees from waggons or carts now in use, and re-place them with their Patent, and allow the full value for them.

All Arms and Axletrees made by J. D. & Co. will be stamped on the body of the Arm,—DRABBLE, MAKER, LONDON,—all others are counterfeits.

J. D. & Co. beg to say, as it is so essential all Patent Axles should work with Anti-corrosive Oil, they have arranged to supply, to those using their Patent Arms, the best Purified Animal Oil, warranted not to corrode, being the cheapest and only Oil fit for their use.

ORDERS BY POST STRICTLY ATTENDED TO.

ГОРЬКО

ДРУЖЕЛЮБЪ ИЛИ ОДНОУМЪ ИЛИ ОДНОУМЪ

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Great Exhibition, 1851. Class 5, No. 758.

STEEL CHURCH BELL,

Invented, Designed, & Manufactured by

FRANCIS DRURY,

26, ALBERT TERRACE,

BARNSBURY ROAD,

ISLINGTON, LONDON.

Registered according to Act of Parliament, May 1850.

F. DRURY'S STEEL WIRE BELLS, (by some called Gongs) having met with so much success, and having been brought into general use by all Clock Makers in England, Scotland, and Ireland, applying them to every description of House Clock, (in place of the ordinary shrill-toned Bells) for the last 25 years; he has been induced to make one on a larger scale than has ever hitherto been tried in this or any other country, for use in Churches, Stable Clocks, &c.

The result is, that this, the First Model of the kind, with all the imperfections generally attending the trial of a new scheme, is sufficient to prove its great utility, to the scientific world.

A second model will no doubt fulfil all the expectations of the Inventor; Bells of this kind (if he may be allowed to call them so) giving good and deep solemn tones well suited for such edifices as Churches, and at one third the usual cost of other Bells.

The Prices will vary according to size. Fitted up with Tolling Hammers, &c., complete, from £10 to £50 each. Three powerfully toned Bells can be supplied for £90, protected against rust, &c.

N. B. Imitations of all Church Bells made on a small scale, to order, for ringing changes upon, or for the quarters in common House Clocks. Applied also to new or old Clocks of every kind.

KINGCOMBE, Printer, 46, High Street, Camden Town.

STEEL CHURCH BELT
MANUFACTURED BY
MR. ALBERT T. BARNARD
BARNARDY BROS.
LONDON.

It is a well known fact that the most reliable and durable of all belts is the one made of steel. The Steel Church Belt is made of the finest quality of steel, and is guaranteed to last for ever. It is the only belt that can be worn in all climates, and is the only belt that can be worn by all persons. It is the only belt that can be worn by all persons, and is the only belt that can be worn by all persons.

For the full particulars of this belt, and for the names of the agents, please apply to the nearest agent, or to the London Office, at 10, Abchurch Lane, London, E.C. 4.

The Steel Church Belt is the only belt that can be worn by all persons, and is the only belt that can be worn by all persons. It is the only belt that can be worn by all persons, and is the only belt that can be worn by all persons.

For the full particulars of this belt, and for the names of the agents, please apply to the nearest agent, or to the London Office, at 10, Abchurch Lane, London, E.C. 4.



DUNAIME



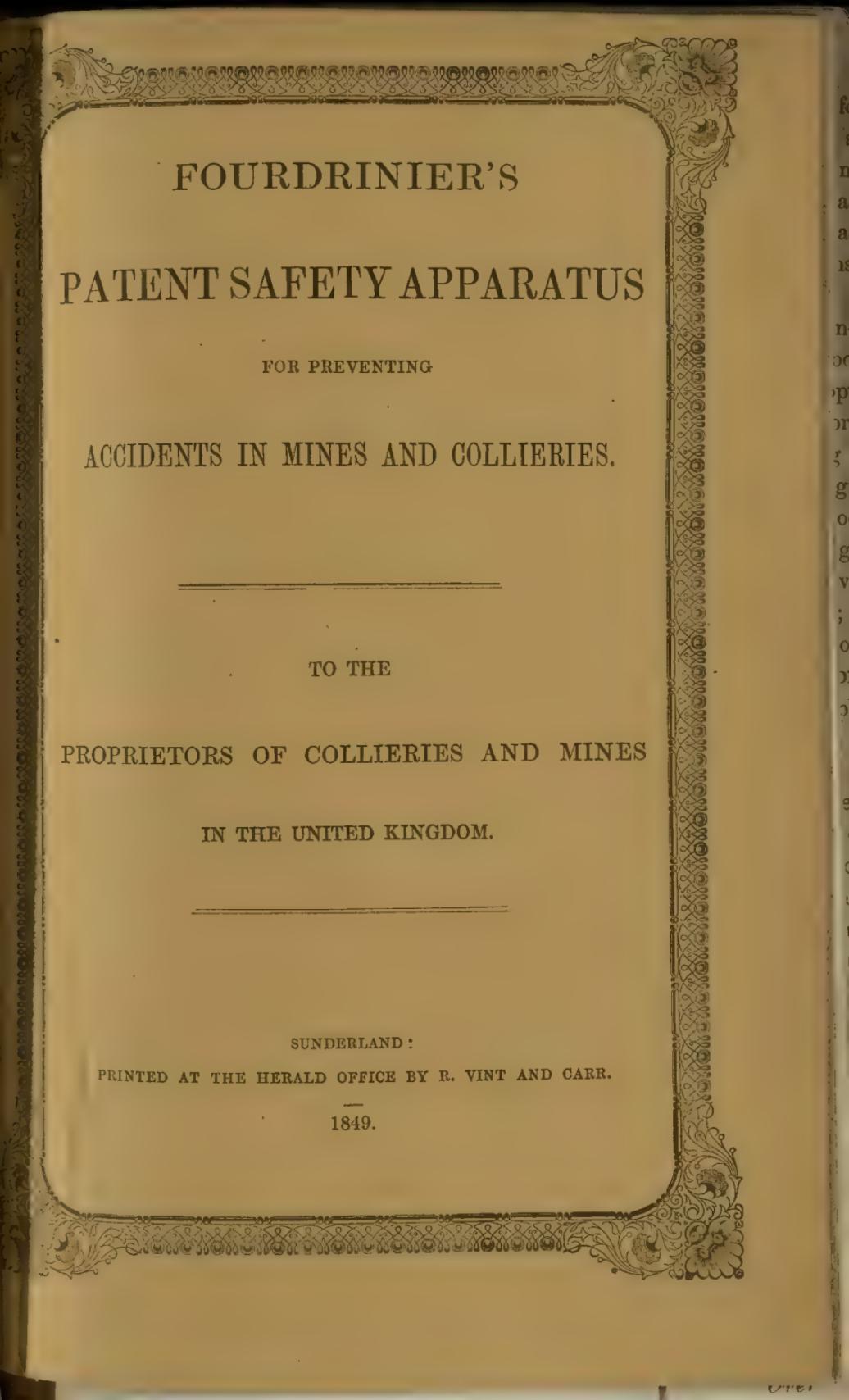
Fabricant de Voitures,

18, Rue Lepeletier, 18,

près l'Opéra.

PARIS.

64 bis Parthé, rue de Moine 15 bis Paris



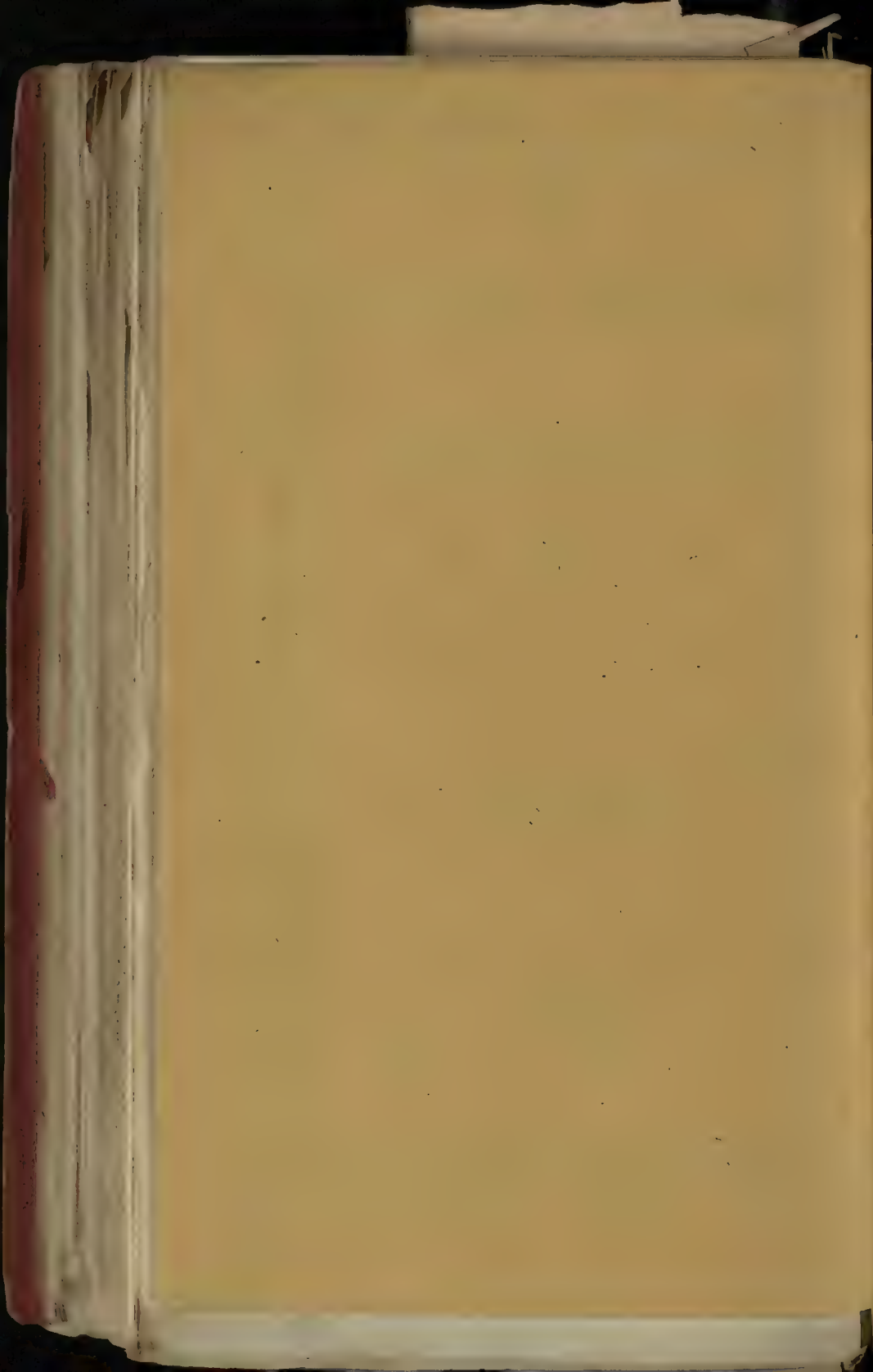
FOURDRINIER'S
PATENT SAFETY APPARATUS

FOR PREVENTING
ACCIDENTS IN MINES AND COLLIERIES.

TO THE
PROPRIETORS OF COLLIERIES AND MINES
IN THE UNITED KINGDOM.

SUNDERLAND:
PRINTED AT THE HERALD OFFICE BY R. VINT AND CARR.

1849.



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1849.

TO THE

PROPRIETORS OF COLLIERIES AND MINES

IN THE UNITED KINGDOM.

MY LORDS AND GENTLEMEN,

Having resided for some years in a colliery district in Staffordshire, I have become acquainted with the many melancholy and fatal accidents constantly occurring from the breakage of ropes or chains, and believing that some mechanical apparatus might be arranged to prevent this fearful loss of life and injury to property, I have now the satisfaction to assure you that, after much labour and expense, I have succeeded in producing an apparatus fully efficient for the object, and for which I have obtained patents. The advantages of the invention, you will, no doubt, allow are fully borne out by the certificates and testimonials annexed. To prove that some means are necessary for the protection of those who are obliged to descend pits, I herewith add an analysis of the causes of death of 415 persons, recorded in "The Mining Journal," from 1st January, 1848, to 31st December inclusive, but which only exhibits a very small portion of the mining districts, naming only nine counties in England, and not alluding to one accident in Scotland, I may, therefore, justly infer that had a more general return been made the numbers would have been most fearfully increased.

Deaths.	By Explo- sion.	Breakage of Ropes or Chains.	Falling down Shafts.	Falling of Roofs.	Suffoca- tion.	Tram Waggons.
Wales	43	22	6	39	5	1
Lancashire	24	10	13	9	..	3
Staffordshire ...	35	37	24	65	3	..
Cornwall	7	4	16	8	..	..
Derbyshire	2	..	1	13	..	..
Durham	16	4	1	2	2	0
Northumberland	3	2	..	1	2	..
Shropshire	2	8	..	3	..	..
Cumberland....	30	2	1	1	1	..
	162	89	62	141	13	10

I now beg to make extracts from sundry newspapers of the correspondence, from time to time, bearing upon the merits of my invention—the perusal of which, with a diagram of my apparatus, shewing its simplicity and efficiency, together with a scale of the moderate terms for licences now offered for your consideration will, I hope, very much facilitate its immediate adoption, and, for the future, greatly diminish the loss of life occasioned annually by the breakage of ropes or chains, or *the equally fatal accident of being drawn over the pullies.*

IMPORTANT TO MINERS.

PREVENTION OF ACCIDENTS FROM THE BREAKAGE OF ROPES AND CHAINS.

(From the Staffordshire Advertiser of June 23.)

When we first introduced Mr Edward Fourdrinier's patent safety apparatus to the notice of our readers, it was with full confidence in the success of the invention, for we had seen it subjected to severe trials with a loaded corfe, and we knew that Mr Fourdrinier had perilled his own safety—if peril there were—by ordering the rope to be cut when he was upon the apparatus, to which alone, therefore, he was indebted for being upheld in mid-air instead of precipitated to the bottom of the pit. With these facts before us, we had no hesitation in directing public attention to the merits of the invention soon after it was patented; and we were more than desirous that the mining interests of our own county should have the credit of being the first to afford encouragement to what promises to be the means of saving many valuable lives. Although we have been disappointed in this wish, we do not think that either the highly-respected patentee or the cause of humanity will suffer from the invention having just received that consideration among the coal-owners and agents in the north which was withheld in Staffordshire. It is well known that the Collieries of the Tyne and Wear are generally worked in the best possible manner;—that there precautions are taken to ensure the safety of the workmen, which are neglected elsewhere, whilst the scientific attainments of most of the “viewers” give their opinion the stamp of authority in matters pertaining to their professional pursuits.

As we have before explained, the object of Mr Fourdrinier's invention is to fix the corfe or cage firmly and instantaneously to guide posts or chains (either suspended or fixed down the pit), by means of self-acting springs, levers, and wedges, attached to the top of the corfe or cage, which come into action when the rope breaks, or otherwise becomes disengaged. A constant source of danger also exists of the drawing of the load over the pullies through the negligence of the engineer,—an accident attended with certain death to the men, as well as great damage to the shaft. This casualty Mr Fourdrinier also entirely prevents by attaching to the chain a disengaging apparatus, such as that made use of in the pile driving machine, the corfe being at the moment of disengagement left affixed to the guides, at a certain distance below the pullies. The invention may, therefore, be said to provide entirely against the breakage of the rope or chain, or the drawing up against or over the pullies, whilst it produces a very economic effect in several particulars.

To the Editor of the Mining Journal.

SIR,—Having so frequently experienced your kindness in noticing my invention in your valuable journal, I beg to hand you copies of a correspondence between Mr Elliot and myself, the perusal of which will, I hope, prove satisfactory to you and your numerous readers interested in the welfare of the working miner. Since I brought my invention before the public last year, I have succeeded in simplifying it to my entire satisfaction, and have also obtained the following most desirable advantages:—1. The apparatus is now fixed upon the top and forms part of the cage, which removes the objection of extra weight, and also keeps the wedges freely in action, and always visible when at the top or bottom of the shaft.—2. It is also of great assistance by the action of the springs to the wire rope, by giving them an artificial elasticity, which has long been wanted.

These advantages, and a determination on my part to put the price for licenses upon a scale that shall be within the reach of all mine-owners, will, I hope, ensure its general adoption, and thus secure the miner, at any rate, from one of those fatal accidents to which his hazardous occupation daily subjects him. The cages to which my apparatus are attached at Usworth Colliery are 7 feet 8 inches between the guides, and I am glad that I was so fortunate in the first instance to apply them to a shaft so much larger than those in general use in this and other neighbourhoods.

EDWARD N. FOURDRINIER.

Sunderland, June 12.

To George Elliot, Esq., Wearmouth Colliery, Sunderland.

SIR,—Now that you have had two of my "Patent Safety Apparatuses" at work in your colliery, at Usworth, near Newcastle-upon-Tyne, since the 16th April, I hope you will consider that sufficient time has elapsed since its adoption to warrant you in giving me a report as to its efficiency. I am most anxious for your opinion of the invention, as many parties in this and other neighbourhoods are waiting the result of your trial, before putting it into their pits. I beg to thank you for the opportunity you have afforded me of bringing this patent before the mine owners in a working condition at Usworth.

Yours, &c.,

EDWARD N. FOURDRINIER.

Wearmouth Colliery, Sunderland, June 8.

SIR,—In reply to yours of yesterday's date, wherein you ask my opinion of the utility of your "Patent Safety Apparatus," having had it in use for nearly two months, it affords me very great satisfaction to be able to speak so confidently of its merits. I have tested it several times at the Usworth Colliery with a load of 2 tons 8 cwt. upon it, and in every instance it proved successful in always stopping the load within *five inches* from the point it was at when the rope was severed. I have conferred frequently with Mr Burlinson, engineer, of Sunderland, together with our own practical engineers at the different collieries under my management, all of whose opinions fully confirm my own—"That the application of your invention will fully provide against accidents to human life, resulting from the breaking of ropes or chains used for drawing up or lowering men into pits." I may also mention, that the springs have a very perceptible influence upon the wire rope, by diminishing the jerk when the engine is taking the lift and passing the centre. The depth of our Usworth pit is 170 fathoms, and the load raised from the bottom each time is 48 cwt. I have no objection to allow any person you may send to the colliery to see the apparatus, which is at work every day. You may make use of this communication in any way that may be of advantage to yourself in promoting the adoption of your invention, as

it is my intention (if I can agree with you as to terms) to apply them to the other collieries under my care.

Yours, &c., GEORGE ELLIOT.

THE BREAKAGE OF ROPES OR CHAINS.

To the Editor of the Gateshead Observer.

SIR,—It has long been a great desideratum in mining to provide against a casualty which is continually happening, viz., the breakage of ropes and chains; for, not only do such occurrences necessarily destroy life, but, in shafts which are fitted up with guides, according to the best modern practice, great damage is occasioned to the shaft fittings. Therefore, in the absence of any expedient to provide against such events, the ropes and chains are necessarily withdrawn as worn out long before they otherwise would be. The object, therefore, of this invention, (a descriptive drawing of which, I find, is preparing for publication,) is to fix the cage and tubs firmly and instantaneously to the guides, by means of self acting springs, levers, and wedges, attached to the top, and forming part of the cage, which come into action when disengaged from the rope or chain.

A constant source of danger, also, prevails in the drawing of the load up against the pullies, by the inadvertence of the engineer, which is also attended with next to certain death, as well as great damage to the property. This casualty Mr Fourdrinier, also, entirely removes, by attaching to the chain a disengaging apparatus, such as is made use of in the pile driving machine, the cage being at the moment of disengagement left affixed to the guides at a certain distance below the pullies. The invention may therefore be said to provide entirely against the breakage of a rope or chain, in the drawing up against or over the pullies; whilst it produces a very economic effect in the following particulars, viz.:—With perfect confidence in this invention, the ropes may be worn considerably longer than safety would otherwise warrant, and they are especially benefited by the cage arrangements, inasmuch as the load is lifted in two progressive stages, rather than at present in one abrupt lift, thus doing away with the violent sudden jerk which acts so detrimentally to the machinery. Such is the general description of this invention and its advantages, but as many fancied improvements (especially in mining matters) are discovered after practical experiment to fall short of the utility attached to them by their inventors, a day was appointed, viz., the 14th instant, when numerous viewers and scientific persons were assembled, to witness a trial of the whole apparatus, which has been in current operation since the 16th of April at Usworth Colliery, in the county of Durham, the property of Messrs Jonassohn and Elliot.

The shaft is $10\frac{1}{2}$ feet diameter, and is fitted up with wooden guides, 5 in. by 3 in., and within which a pair of cages are made to work, being 7 feet 8 inches in length between the guides, and each cage containing two tubs, carrying 10 cwt. of coals, so that the weight of the whole moving load may be stated as follows:—

Cage, with lifting chains and patent apparatus	22 cwt.
Two tubs.....	6 cwt.
Coals	20 cwt.

—
48 cwt.

The experiment, therefore, was made by suddenly disengaging the rope which suspended this immense weight, when the apparatus as instantaneously took effect, and the whole mass was firmly affixed to the guides. The experiment was repeated several times with uniform success; and so entirely satisfactory and self-evident was the whole proceeding, that nineteen viewers and scientific persons present, without hesitation, attached their names to the following certificate, drawn up by one of the spectators on the

spot; and the success of the trial was hailed with loud cheers by a large body of colliers who had witnessed the proceedings.

I am, Sir, yours truly,

MATTHIAS DUNN, Colliery Viewer.

Newcastle-on-Tyne, June 15, 1849.

CERTIFICATE.

We, the undersigned, having met for the purpose of witnessing some experiments with an apparatus recently patented by Mr Fourdrinier, for the purpose of arresting the fall of the cage and tubs in case of the breakage of rope or chain, hereby declare our perfect satisfaction with the apparatus, having seen the cage, with two full tubs, weighing in all about $2\frac{1}{2}$ tons, stopped instantaneously upon the disengaging of the rope, and we have no hesitation in stating that it will be highly important, both for the saving of life, and also for preventing damage to the shaft. We therefore certify to the above effect.

MATTHIAS DUNN, Colliery Viewer.
 GEORGE ELLIOT, Colliery Owner and Viewer.
 GEORGE SOUTHERN, Colliery Viewer.
 JOHN TAYLOR RAMSEY, Viewer.
 RALPH COULTHARD, Engineer.
 SEPTIMUS BOURNE, Viewer.
 JAMES CROUDACE, Viewer.
 H. T. MORTON, Viewer.
 R. H. PHILIPSON, Viewer.
 HENRY G. LONGRIDGE, Viewer.
 W. REID CLANNY, M.D., F.R.S.E.
 LEWIS MORGAN, Clerk, M.A.
 W. D. BURLINSON, Engineer.
 R. S. NEWALL, P.P. W. SPENCER.
 EDWARD A. BOYD, Viewer, Urpeth.
 CHRISTOPHER CROUDACE, Viewer.
 JOHN ELLIOT, Viewer.
 JOHN BELL, Engineer.
 THOMAS BUTSON, Engineer.

Usworth Colliery, June 14, 1849.

Several gentlemen, unable to attend the first exhibition at Usworth Colliery, appointed the 25th June to witness the apparatus in operation, and drew up the following testimonial of their unqualified approbation:—

On the 25th of June, Mr Fourdrinier, at the Usworth Colliery, experimented in our presence with his "Patent Safety Apparatus," and produced invariably by it the most certain and satisfactory results. The tubs, filled with coals, were placed in the cage, weighing altogether about 50 cwt., and when descending in the pit the rope was detached, and by the action of the apparatus the whole was immediately arrested in its descent; but for which it would have been precipitated to the bottom of the shaft, 1000 feet below.

Two of the workmen then placed themselves on the cage, and by a touch of their hands, stopped this weight of $2\frac{1}{2}$ tons, and themselves in addition, instantaneously; and so satisfied were four of the gentlemen present of its efficient nature, that they unhesitatingly committed themselves with upwards of a load of 40 cwt. to its protecting operations with the same successful result.

Considering the number and disastrous nature of the accidents from the breaking of ropes and chains, and from being drawn over the pulley, against which the "Fourdrinier Apparatus" completely provides, we believe it to be (wherever adopted) a certain and complete security against such accidents.

WM. ANDERSON, Viewer.
GEO. ELLIOT, Viewer.
JAMES MATHER.
CHRIS. M. WEBSTER.
GEG. W. ARKLEY, Viewer.
HENRY R. WEBSTER.
C. W. ANDERSON.

To the Editor of the Mining Journal.

SIR,—On looking at the sketch of Mr Fourdrinier's apparatus for preventing accidents in Mines from the breakage of ropes and chains, it occurred to me to ask what becomes of the detached rope or chain in case of breakage? For instance, if the rope or chain breaks 100 yards above the cage, is the broken portion of the rope suspended in the shaft, or does it fall down upon the cage? If the latter, what security does the invention give to the men, as the rope or chain falling upon them would inevitably be fatal? Perhaps it is intended to make the top of the cage of great strength to resist the blow; but will not the weight of 100 yards of rope or chain falling down that distance be sufficient to carry away cage, guides, and all the apparatus together? I merely write for information, and not from any wish to detract from the merits of the invention.

A NEWCASTLE COLLIER.

16th July.

ACCIDENTS FROM BREAKAGE OF ROPES IN SHAFTS.

In consequence of the remarks of a "Newcastle Collier" in our last number, expressing fears for the lives of the men ascending or descending Pits by Messrs Fourdrinier's safety apparatus from the falling of the heavy chain,—perhaps 100 or more yards—we have been favoured with a communication from George Elliot, Esq., owner of the Usworth Colliery, where the apparatus is at work, in which the following observations occur, a perusal of which will, we think, quiet all fears or doubts on the subject, either of a "Newcastle Collier" or others interested in this important subject:—"On the 5th inst. we had, at our Usworth Collieries, one of the wire ropes broken at the drum, when the engine was taking its lift of the load from the bottom of the pit, at the depth of about 1000 feet; the total length and weight of the rope fell upon the cage and apparatus attached thereto, without the slightest injury to either the cage, appendages, or guides. It is evident, therefore, had men been in the cage, they would have been unhurt. I may observe, that the total length of the rope was about 200 fathoms, and its weight about 37 cwt.; and the way in which I account for its not injuring the cage is, that the fall of the rope is divided over several seconds of time in its descent, and not possessing the acquired momentum of the same weight in a compact or solid body. The cage top was merely covered with a 3-in. Memel plank. I may conclude by observing, with regret, the fearful accident, quoted in the same paper, of seven poor fellows being destroyed in Flintshire, by the breaking of the rope, which, doubtless, would not have terminated fatally had Messrs Fourdrinier's valuable invention been in use there."—*Mining Journal*, Saturday July 28, 1849.

FOURDRINIER'S PATENT SAFETY APPARATUS
FOR PREVENTING ACCIDENTS IN MINES AND COLLIERIES.



By the adoption of this invention the lives of the working miners may be preserved, and the property of the mine owners protected from the serious consequences of the following accidents :—

1. From the men or load being precipitated to the bottom of the shaft when the rope or chain breaks ; in this case the apparatus is self-acting.

2. From either the men or load being drawn over the pulley ; in this case also the apparatus is self-acting.

The apparatus is readily applied to the present guides now in use, whether they are of wood, iron rods, or chain, and may be attached to the cage in a few hours.

By reference to the prefixed sketch it will be seen that the apparatus is fastened upon the guides by the rope being represented as broken, but when the rope or chain is tight, and the cage in work, the levers are raised on their fulcra, and lower the wedges in the tapered shoes, which slackens them on the guides ; and when the rope or chain becomes broken or detached, the levers drop and raise the wedges into the tapered shoes, and consequently grip the guides firmly on both sides, so that the greater the weight in the cage, the tighter the wedges hold.

TERMS FOR LICENCES FOR WORKING "FOURDRINIER'S SAFETY APPARATUS."

					<i>Per annum.</i>		
					£	s.	d.
For One Shaft from	5 to	40 Fathoms deep	.....	5	0	0	
"	"	40 to 80	"	.....	7	10	0
"	"	80 to 120	"	.....	10	0	0
"	"	120 to 160	"	.....	12	10	0
"	"	160 to 200	"	.....	15	0	0
"	"	200 and upwards	.....	20	0	0	

* In such cases as a proprietor having a number of shafts, and applying the apparatus extensively, the patentee will be ready to make a reasonable and equitable abatement on the above terms.

The unexpired term of the patent being 12 years, any proprietor wishing to buy his annuity may do so at 7 years' purchase.

The patentee, or his accredited agents, from time to time to be permitted to examine and see that the apparatus is kept in proper working order.

In addition to the satisfactory working of my apparatus at Usworth, as already detailed, I have now the gratification to state, that I have applied it to the shaft at the Monkwearmouth Colliery (300 fathoms deep, being the deepest in the kingdom), with equal satisfaction to both masters and men, having sustained the enormous weight of $4\frac{1}{2}$ tons in suspension when the rope was detached.

I have the permission of William Bell, Esq. and Partners to invite you to inspect its operation; and as it is so near to the Sunderland Station it can be seen with much less inconvenience to you than at the Usworth Collieries.

The successful results I have now detailed have already secured me orders for the following mines, all of which I hope will be in operation within a month, viz. :—

WM. BELL, ESQ. AND PARTNERS, Monkwearmouth.

N. WOOD AND W. ANDERSON, ESQRS., Harton.

HUGH TAYLOR, ESQ., MATTHEW PLUMMER, ESQ., Proprietors; JOHN TAYLOR, ESQ., Viewer and Manager, Shotton.

D. JONASSHON, ESQ., AND GEORGE ELLIOT, ESQ., South Peareth.

In conclusion, I beg to state that, by the use of this apparatus, not only is the *proprietor* provided with the *invaluable power* of protecting the lives of the *numerous workmen* daily in his employ, but his *property* also is equally *protected* when the *rope or chain breaks with a load*, or by the load being *drawn up to the pullies*, by which means the heavy losses occasioned by these accidents *are prevented*, and also by the economy in the use of the ropes by the *elasticity of the springs*, and which form a very heavy amount in Colliery workings.

These advantages, combined with the moderate terms I have named for the use of my invention, will, I hope, be considered

EXHIBITOR, W. BELL & CO. MONKWEARMOUTH

no more than equivalent for the benefits conferred both on masters and men.

I have the honour to be,

My Lords and Gentlemen,

Your most obedient servant,

EDWARD N. FOURDRINIER.

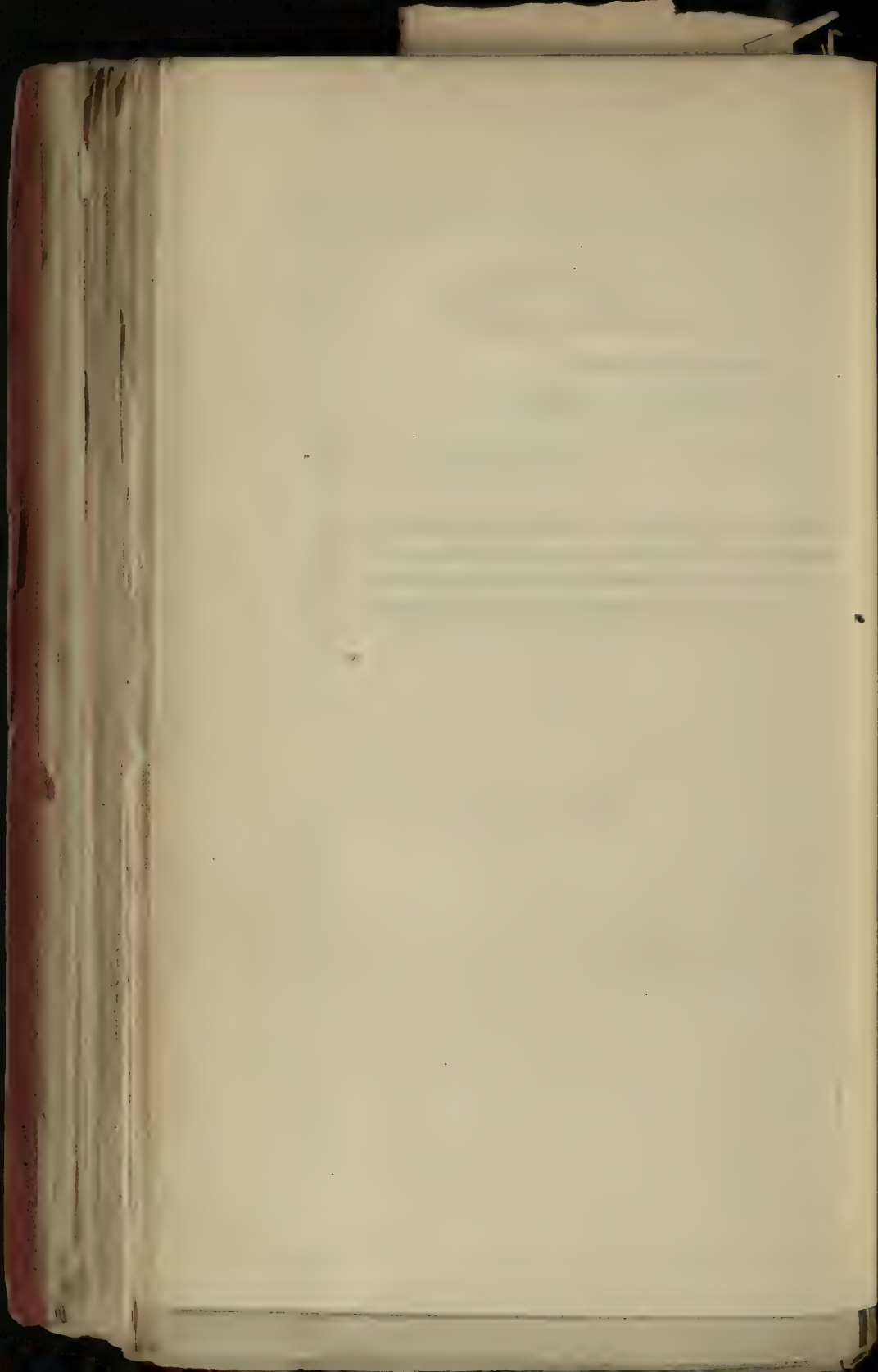
Sunderland, 20th August, 1849.

N.B. For further information, or to treat for Licenses, application may be made to the Patentee, Mr. E. N. FOURDRINIER, near Monkwearmouth Colliery, Sunderland; or, Mr. JOSEPH FOURDRINIER, 9, College Place, Camden Town, London.

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EXHIBITOR, Wm. ...
... STREET, LONDON, ENGLAND

The Pump is now in the ...
... the Pump ...



1. Pump is used for the purpose of raising water from the well to the surface. It is a simple machine consisting of a cylinder with a piston and a valve at the bottom. The piston is connected to a handle which is turned by hand. The valve at the bottom of the cylinder opens and closes as the piston moves up and down. When the piston moves down, the valve opens and water enters the cylinder. When the piston moves up, the valve closes and the water is forced out of the top of the cylinder. This process is repeated until the water is raised to the surface.

EXHIBITOR, W. W. W.

W. W. W.

100 EAST, NORWICH

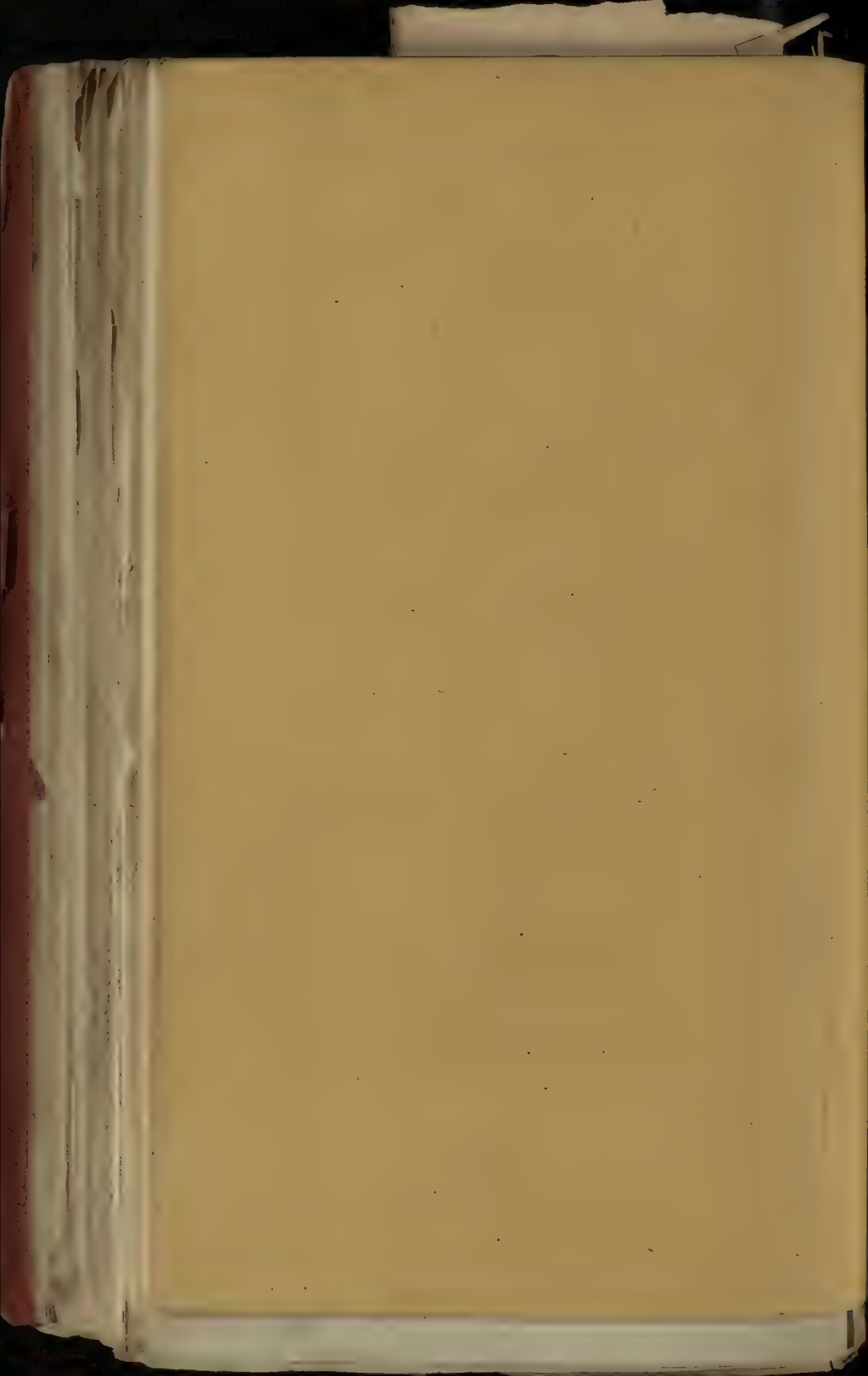
STREET, NORWICH

W. W. W.

EXHIBITOR, W. W. W.

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W. W. W.



PATENT OMNIBUS, AND CABRIOLET.



This is an Invention intended to supply a want long felt by the Cheap Travelling Community, viz: An improvement upon the present system of building public conveyances: it combines within itself the following advantages:

1st—A separate compartment for each passenger, (upwards of 26 inches wide,) which obviates the possibility of Robbery, or Infection, or annoyance of any kind, whilst, should it be desired communication is easily attainable,

2nd—An outside Gallery with a separate door to each compartment, which does away with the nuisance formerly experienced, especially by Ladies, of entering at the end of the Omnibus, as at present constructed.

3rd—A method of reaching the roof by steps placed at the end, which will be considered by those who prefer riding on the outside, a great improvement upon the present dangerous and inconvenient way.

This Omnibus is at least 200 weight lighter than those at present in use, and patents for its Invention have been taken out, not only in England, but in several Foreign Countries.

An Omnibus constructed on this principle, is at present running **experimentally**, between, Bayswater and Charing Cross, which meets with general approval from the public at large, and has been very favourably noticed by the Metropolitan Press, especially by the "THE TIMES" and "THE GLOBE."

(From the Times of the 17th March, 1851, page 3.)

"Patent Omnibus.—A good deal of curiosity was occasioned on Thursday in the line from Bayswater to Charing-cross by the appearance of a new omnibus, which certainly brings to bear many, if not all, the desired ends of such conveyances. Each traveller has a seat to himself, and such seat is as private as a box at the Opera, while ladies may thus ride as secure from annoyance, as in their own carriage. The most novel feature is the way in which the passengers obtain their places, both in the body of the omnibus and on the roof—to the latter, indeed, a child may ascend without fear of injury. The appearance of so useful a means of transit at this particular moment may be looked upon as an evidence that ingenious minds are at work to provide effectively not only for the ap-proaching crowds, but for the ultimate comfort and security of the cheap travelling community.

(From the Globe of the 21st March, page 1.)

"Omnibuses and Public Conveyance.—It is now upwards of 20 years since the first omnibus, a foreign importation, was started in London, yet, strange to say, during that period not a single improvement worthy of notice upon the original cumbersome and inconvenient vehicle has taken place. Nor does such improvement now arrive from those who, being most interested, would be presumed to be most alive to the necessity. We are to be indebted to a private gentleman, a Mr. Frank-linski, for the first radical improvement in our street convey-ances, who, in the new omnibuses now running experimentally from Bayswater to Charing-cross, has certainly succeeded in awak-ening our gratitude for the introduction of efficient means of metropolitan transit. By it we and our friends, and more especially ladies, may travel from one place to another without fear of inconvenience or annoyance of robbery or infection. The general arrangement, and the great comfort it ensures, leave nothing to be desired, and it can be alone a question of time to witness its appearance on all the principal routes."

Enquiries may be directed to A. FRANKLIN'S, Esq., 27, Upper Southwick Street,
Cambridge Square, Hyde Park.

THE GOSPEL OF MATTHEW

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This Improved Landau Carriage;

N^o 845. Class 5. in the Great Exhibition;

contains a new modification of the side Glasses, giving a light and elegant appearance to the Carriage; and by a new arrangement of the frame work and joints, the roof is made open further each way, so as to be entirely clear of the persons riding inside.

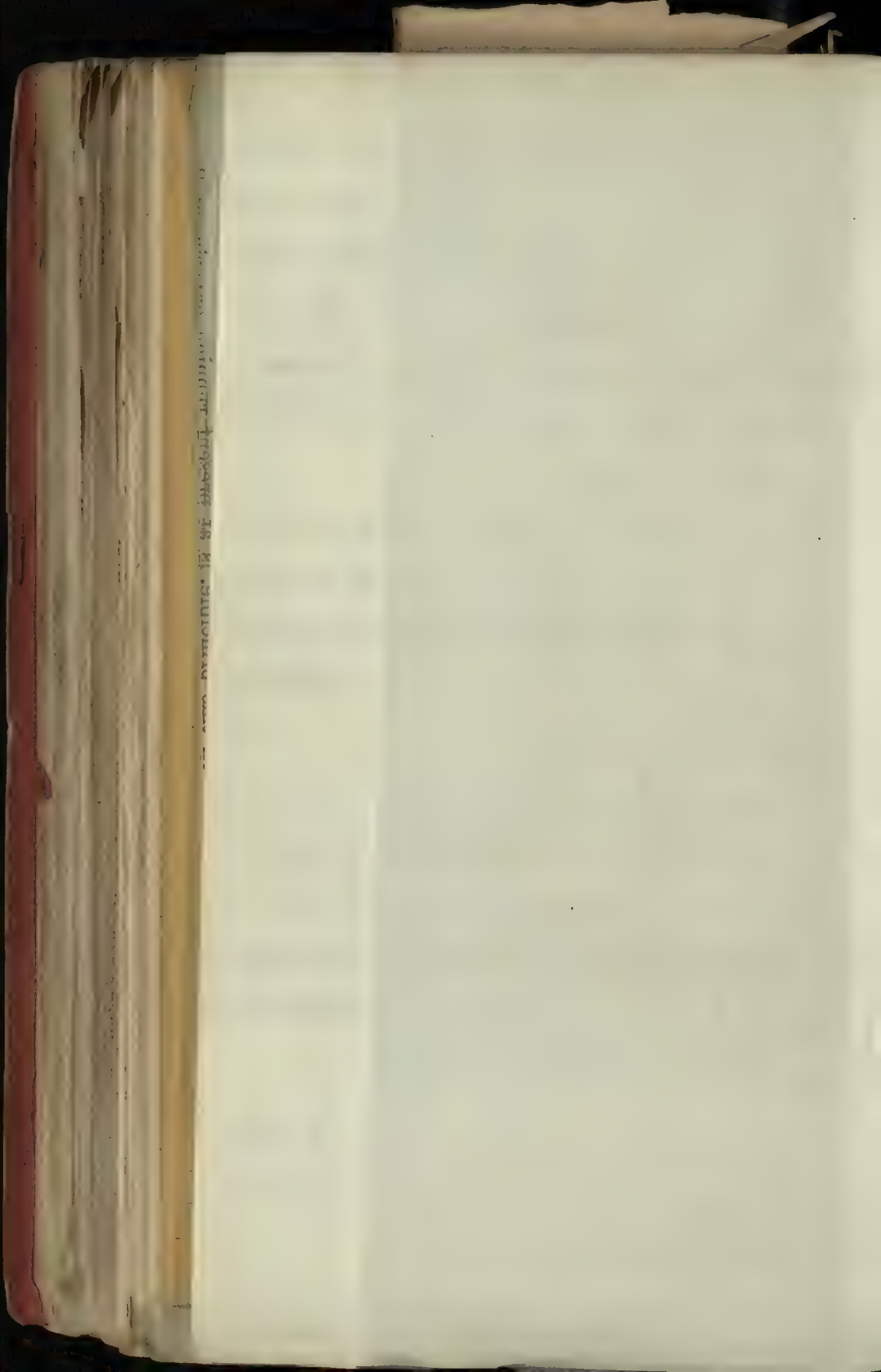
A great advantage is also gained by a novel arrangement of the Springs, which adds very greatly to the comfort and easings of the Carriage; this very important improvement consists in the introduction of two light elastic Springs, parallel with each other, in the place of one as used heretofore. The exquisite substance of a single spring being such as nearly to destroy elasticity, from the friction of so many plates rubbing on each other: whilst two light ones with half the number of plates in each, and weighing together less than the single one, support the same weight with full elasticity and easings of motion.

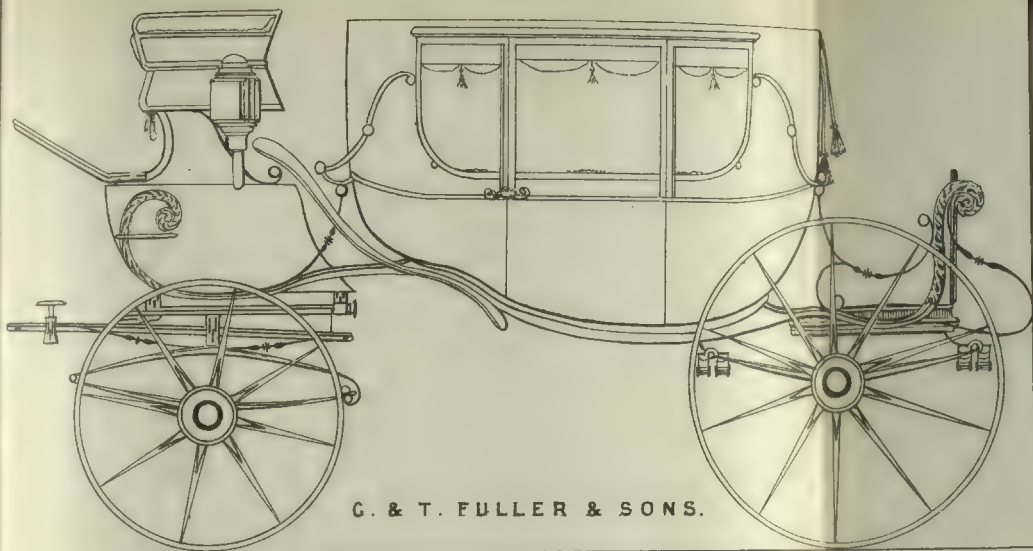
G. & T. Fuller,

Inventors and Manufacturers

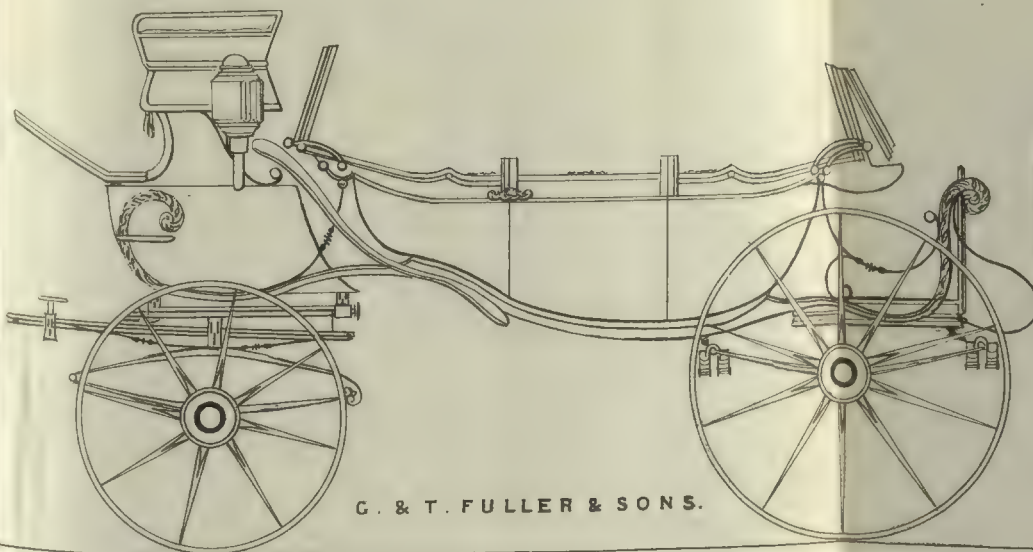
Coach Manufactory,

Bath; 30th August 1851.



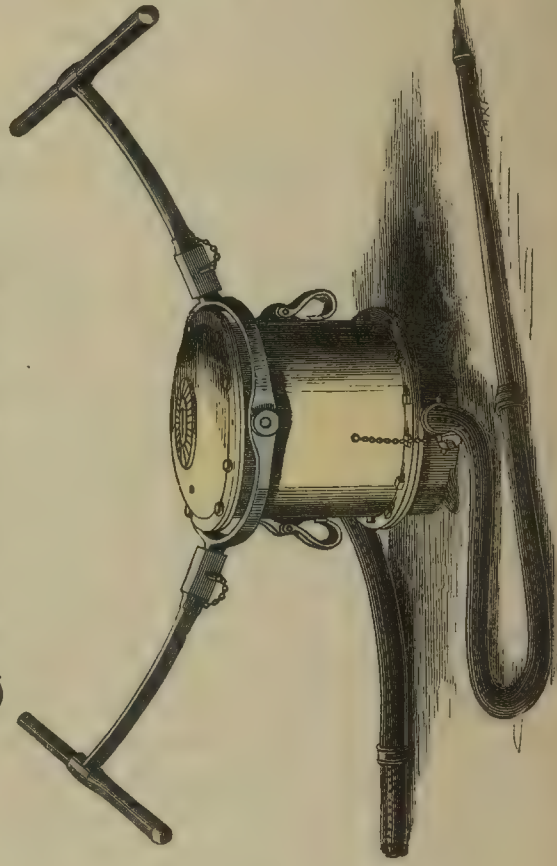


C. & T. FULLER & SONS.



C. & T. FULLER & SONS.

GOSWAGE'S



IMPROVED
PORTABLE
ENGINE-PUMP,
SHIP'S
FIRE-ENGINE.
AND
WATERING
ENGINE.

AGRICULTURAL
LIQUID-MANURE
DISTRIBUTOR,
AND
GENERAL-PURPOSE
PUMP.

MANUFACTURER, J. STONE, 11, DOVGATE-HILL, LONDON.

THIS Portable Engine Pump, designed for the use of Ships (especially Ships of War) is available for all the purposes of a Lift and Force Pump; it may be used for a Fire-Engine, Watering-Engine, and Wash-Deck Pump; also, as an auxiliary to, or substitute for, any fixed Pump on board of Ships, in case of need, and can be used to wet the sails, or to work in a boat to wash the Ship's side, and to extinguish fire in the last extremity. It is applicable also as a most durable and effective Liquid Manure Distributor for Agricultural purposes.

The principal advantages, as compared with other similar Machines, are its greater portability, and working in less space; its increased durability under the action of sea-water; and its being less liable to injury from accident, or to get out of order. It is also provided with Metallic Valves in lieu of leather, and with vulcanized Indian-rubber Discs between the piston cups; and from its construction is adapted to *all climates*, and it does not become inefficient by not being kept in constant use, or by being kept free from water. They have been much approved in her Majesty's Navy; were considered very suitable for the Ships of the Arctic Expedition; on the coast of Africa, and other Stations, as well as in the Russian Navy.

The sizes in use are two, viz., Small and Large, either of which may be carried under hand by two men, and one or more men may work either of them. They discharge from 46 to 78 gallons of water in a minute, and in calm weather force the jet of water about 80 feet in height.

The following is a description of the Gear of the Portable Engine-Pumps, as supplied to the Navy:—

Item. No.	Working Board, and Box for Gear.	Item. No.	
1.	Hoses, Delivery, leather, rivetted; for attaching to the engine-pump, when used as a watering-engine on shore, as a fire-engine, and under all circumstances where canvas hoses would be too pervers for the force required. In 40 feet lengths.	10.	Beat Pipes, copper, for filling casks.
2.	Hoses, Delivery, canvas; to attach to the end of the leather hose for watering the ship, for conveying fresh water from the shore through the sea, &c.; the leather strap on each serves to keep the hose in coil, and also for securing it to an oar or buoy to float the hose. In feet lengths.	11.	Hose Wrenches, iron.
3.	Hoses, Suction, leather rivetted, with spital; for lifting water from any depth within the ordinary limits of atmospheric pressure. In 6½ feet lengths.	12.	Turnscrew, portable, iron; to suit the screws of the engine pump.
4.	Strainer, copper; to be attached to the end of the suction hoses, to prevent weeds, dirt, chips, or stones being drawn into the engine pump.	13.	SPARE GEAR.
5.	Double-Screw, mixed metal, to connect the smaller suction hoses to the larger sizes used on board Her Majesty's ships.	14.	Rings, or Washers, of leather for Hose Screws.
6.	Neck Piece, mixed metal, with female swivel, and male-screw ends; to be inserted between the suction-hoses, or on to the engine when the hoses are likely to be injured from hanging on a bend, such as over the ship's side, the coamings, &c.	15.	Cup or Piston Leathers.
7.	Branch Pipe, copper, fitted with a mixed metal jet-pipe; to be used for extinguishing fire, wetting sails, washing the ship's side, &c., &c.	16.	Screws, mixed metal, assorted.
8.	Double Connecting Screw, mixed metal, for connecting the canvas to the leather hoses, to branch off into two streams of delivery when required.	17.	WASH-DECK GEAR.
			Deck Screw and Cap, mixed metal; for soldering to the lead "wash-deck pipe," leading from the wing-cock to the deck.
			Neck Piece, mixed metal, with female swivel ends, to connect the suction-hose of the engine-pump with the duck-screw, No. 16; for drawing water from the wing-cock pipe, for wash-deck purposes, &c.

2 JULY 1882



R. & W. HAWTHORN'S

FIRST-CLASS

PASSENGER

LOCOMOTIVE ENGINE,*

"THE HAWTHORN,"

SENT TO

THE GREAT EXHIBITION OF 1851.

CYLINDERS, 16 inches diameter; stroke of piston, 22 inches: driving wheels, $6\frac{1}{2}$ feet General Dimensions. diameter; leading and trailing wheels, 3 feet 9 inches diameter; heating surface of fire box above the grate bars, exclusive of tube ends and fire door, 98·6 square feet; total area of fire box, including tube ends, fire door, and surface below the upper side of grate bars, 110 square feet (the fire box has a bridge, with water space across the centre); 158 brass tubes, 2 inches interior diameter, having a heating surface of 865·4 square feet. The maximum speed with an average express train being equal to 80 miles an hour on a good line of railway.

The patent improvements introduced into this engine are—

FIRSTLY.—Messrs. HAWTHORN'S Patent Double Compensating Beams. The com- Compensating Beams. pensating beams and springs (two beams and two springs on each side) are introduced, instead of the six ordinary springs (one to each axle-bearing), by which arrangement a direct and simultaneous connection or action is communicated to all the axle-bearings, so that a uniform weight is constantly maintained upon all the wheels and axles, no matter the imperfections or irregularities in the line of railway; securing thereby a constant amount of weight upon the driving wheels for adhesion (which may be adjusted by varying the fulcrum of the beams), which is of great importance to a first-class engine, wherein the power is only communicated to one pair of wheels, and which in practice

* It was Messrs. HAWTHORN'S intention to send a different description of engine to the Exhibition—one of greater novelty, and more generally adapted to branch and other lines of railway, for mixed trains, and where high speed is not of so much importance; but the limited period first fixed for the reception of machinery by the Executive Committee, deterred Messrs. HAWTHORN from proceeding with the engine or any other engine for nearly a month, when the Committee communicated to them that the period would be extended; and to meet their wishes, Messrs. HAWTHORN had then no other alternative than to complete the engine now sent to the Exhibition (having the materials on hand), which they did in an inconceivable short time, and into which they introduced their patent improvements.

is often found deficient, and attended with great inconvenience, in engines with the ordinary six springs.* The direct and simultaneous connection between the axles above-mentioned, gives great stability and easy motion to the engine, which was fully proved in the transit of the engine by rail from Newcastle to London, and particularly when running at high speeds. In addition to the advantages hereby given to the engine itself, considerable saving is effected in maintaining the permanent line of railway. In "The Hawthorn," the axles have all outside bearings, with driving wheels in the centre, and the carrying wheels at each end (the trailing axle immediately behind the fire box), which arrangement of wheels and axles have, with very few exceptions, been adopted by the first engineers and locomotive-engine manufacturers, as being the best in principle for first-class passenger or express engines. Although the necessity of having at times to put an undue weight upon the springs of the driving wheels in an engine with the ordinary six springs, to secure the required adhesion, operates on such occasions considerably against the arrangement, by giving to the engine an undulating or pitching motion, which at times renders it unsafe, and particularly so at high velocities—the permanent railway also suffers less or more injury in such instances; but the whole of which are entirely obviated by Messrs. HAWTHORN'S Patent Double Compensating Beams, previously mentioned.

Slide Valves. SECONDLY.—Their Patent Slide Valves, which may be made either of brass or cast iron, are placed vertically between the cylinders in one steam chest in the usual manner. One slide valve has a plate cast or bolted upon the back, as represented by the sectional drawings, which is planed correctly parallel with the face of the valve. The other slide valve has a box cast upon the back, into which is fitted a projection or piston. The face of this piston is also planed parallel with the face of the valve, and packed in the most simple manner and made steam tight, the slide valves are then put into the steam chest as in ordinary valves—the plate and piston work against each other steam tight, and the very trifling movement of the piston will insure the packing keeping perfectly tight for a great length of time, and when required to be renewed it is only necessary to remove one of the steam chest bonnets and draw out the valves. A passage is formed between the exhaust ports through the slide valves, thus giving a free discharge to the steam; by this arrangement of patent slide valves, they are relieved from one-half the pressure of steam, and consequently one-half the friction and power to work them, and also a like proportion of the wear and tear of the faces and gearing.

THIRDLY.—Their Patent Link Motion is also introduced into this engine. The link (termed the expansion link), instead of being connected to the ends of the eccentric rods, and having to be constantly moved up and down with them (which with the great

* Occasionally, engines have been made with the driving wheels placed behind, and the motion communicated thereto by outside connecting rods, through the medium of a distinct crank axle; but the driving wheels being so placed, curtails the foot plate very much, and renders it very inconvenient to the engine driver and stoker; and the outside connecting rods have almost invariably been considered objectionable, and attended with less or more danger to passenger engines, particularly when running at high velocities.

right of the link requires very strong gearing,) is directly connected by an eye joint to the slide rod and there suspended, hence its weight is removed from the reversing gear, the link having thus a fixed centre less power is required to reverse and regulate the slide valves, the action of the valves are more correct, and particularly when cutting the steam and working expansively; the link is also much more durable by admitting what is termed the sliding block, being more than *three* times the length of the ordinary block, hence a great saving in the wear and tear of the link and gearing; another important advantage is that the link permits of the boiler being brought down nearer to the axles. (See the drawings or the engine itself)

FOURTHLY.—Their Patent Steam Pipe is likewise here introduced, which does away Steam Pipe. with all domes or cumbrous projections on the top of the boiler. The pipe is fixed into the tube plate of the smoke box by a ferule like an ordinary tube, and extends nearly the full length of the boiler near to the top; it is perforated with a series of small apertures or slits along the entire length, so proportioned as to admit the steam into the pipe directly above where it is generated, instead of having to rush from all parts of the boiler to one or two orifices, so that the steam is carried to the cylinders more pure, and priming, as technically termed, is prevented to a great extent.

NOTE.—It may be here observed that both the inside and outside framing extend the full length of the engine, and are firmly tied together by strong iron double knee brackets, and that the cylinders, guide bars, pumps, axles, &c. in short, the whole machinery of the engine is perfectly fitted and fixed entirely independent of the boiler, and when so completed and the wheels and axles put into their respective places, the boiler is then, but not till then, put in its place and firmly secured by bolts to the double-knee brackets above mentioned and the outside framing.

It may be further noticed, that R. and W. HAWTHORN were the first that applied the *Four Fast Eccentrics* to the locomotive engine, which they introduced into one of the two engines ("The Comet") that were employed in the opening of that part of the Newcastle and Carlisle Railway between Blaydon and Hexham. The other engine, furnished by another house of the oldest standing, had two loose eccentrics, with a striking clutch to reverse the engine; immediately after which, the four fast eccentrics were introduced by all engineers into locomotive engines, R. and W. H. giving the advantage of their invention to the public, without claiming any remuneration for it.

The reversing gearing, as at present generally used, was also first introduced by them into the "Tyne" engine, shortly afterwards also furnished to the Newcastle and Carlisle Railway; both of which inventions will be apparent by an inspection of "The Hawthorn," which is the first locomotive engine into which R. and W. HAWTHORN'S three first-named patent improvements, and other novelties, are introduced.

Newcastle-upon-Tyne,
May 12th, 1851.



WATSON'S **FIRST-CLASS PASSENGER ENGINE** **EXHIBITION IN THE GREAT**

See "The Engineer" and "The Railway" for full particulars.

The first-class passenger engine is a fine specimen of the art of steam engineering. It is a four-wheeled engine, with a horizontal boiler, and a tall chimney. The engine is built for speed and power, and is capable of pulling a heavy train. The boiler is made of iron, and is riveted. The cylinder is also made of iron, and is connected to the piston by a long rod. The piston is made of iron, and is connected to the crank by a short rod. The crank is made of iron, and is connected to the flywheel by a long rod. The flywheel is made of iron, and is connected to the axle by a short rod. The axle is made of iron, and is connected to the wheels by a short rod. The wheels are made of iron, and are fitted with rubber tires. The engine is built for speed and power, and is capable of pulling a heavy train.

This Pump is the Professor's Pump. **EXHIBITOR,** TOMBLAND, NORWICH STREET,

LOCOMOTIVE MECHANISM IN THE GREAT EXHIBITION.

MESSRS. HAWTHORN'S FIRST-CLASS PASSENGER ENGINE, "HAWTHORN."

(From the "PRACTICAL MECHANIC'S JOURNAL," July and September, 1851.)

Side by side with the gigantic champions of the broad and narrow gauge locomotives, whose stupendous proportions make us tremble for the unfortunate rails which have to carry them, stands an engine of more modest demeanour—the "Hawthorn," an example of the designing and constructive abilities of Messrs. R. & W. Hawthorn of Forth Banks, Newcastle. This engine, for which the makers claim a capability of safe travelling at eighty miles an hour, with a large express train, is of the six-wheeled inside cylinder class, and embodies four very important points of improvement. These are the *Double Compensating Beams* for distributing the weight more uniformly on the wheels—*Equilibrium Slides*—*Expansion Link* suspended from the slide-rod—and the *Perforated Steam Pipe* for the conveyance of dry steam to the cylinders. Our engraving, plate 80, exhibits a longitudinal elevation of the engine on a small scale, with five additional detailed figures, delineating the valves and link motion.

Fig. 1 is a longitudinal elevation of the engine on the rails, with a portion of the upper side of the fire-box, cylindrical boiler, and smoke-box broken away, to show the perforated steam-pipe leading to the cylinders. Fig. 2 is a horizontal section of the slide-valve, chest, slides, and steam-ways to each cylinder. Fig. 3 is a corresponding transverse section of the slides, chest, and portions of both cylinders. Fig. 4 is a side elevation of the improved expansion link, showing the two eccentric rod ends, valve spindle, and regulating lever and links. Fig. 5 is a corresponding end or edge view of the link and its appurtenances, a part of the upper end of the link being broken away. Fig. 6 is a plan or horizontal section of the link, showing also one of the eyes of the valve spindle in section.

The cylinders are 16 inches diameter, with a stroke of 22 inches, and the driving wheels are 6 feet 6 inches diameter, with leading and trailing wheels of 3 feet 9 inches. The heating surface of the fire-box above the grate-bars, and exclusive of the spaces taken up by the tube-ends and fire-door, is 98.6 square feet; the total area of the fire-box, including the tube-ends, fire-door, and surface beneath the upper side of the grate-bars, amounting to 110 square feet. This includes a hollow bridge across the centre, forming an additional water space. The tubes, which are of brass, are 158 in number, the external diameter being 2 inches, furnishing a further extent of 865.4 square feet of heating surface.

The leading feature of this engine has reference to the mode in which it is supported on its springs. Instead of fitting a spring to each wheel, two only, *A A*, are placed on each side of the engine, between the wheels.

These springs are inverted, and are sustained by central straps attached at *a a* to the framing, their ends being connected by short links to the wrought-iron double-compensating beams, *b b*, placed longitudinally on each side of the engine, inside and beneath the framing. The two inner contiguous ends of these beams are linked by a transverse pin to an eye at the bottom of the axle-box of the driving axle, whilst the opposite ends of the beams are respectively linked in a similar manner to eyes on the top of the leading and trailing axle-boxes. The connection of these beams is pretty obvious. By them, a direct and simultaneous connection is given to all the axle-bearings, so that a uniform weight is constantly maintained on all the wheels, totally irrespective of any irregularities in the level of the rails on which the engine travels, and an unvarying amount of adhesion is in this way secured. Considerable additional sta-

bility and easiness of motion is also found to arise from this system of spring connection—a fact which was fully proved during the run of the "Hawthorn" up to London to the Exhibition. We may remark, that although the fulcrums of the compensating beams are here represented in the centre, they may be varied to give any required weight upon the respective wheels.

The slide-valves, figs. 2 and 3, are placed on vertical faces, in a single steam-chest, between the pair of cylinders. One slide has a plate, *d*, cast or bolted on its back, and planed to correct parallelism with the working face; and the other has an open box, *e*, cast on its back to receive a piston, *f*, having an upper or end face, also planed parallel with the valve face. The piston is fitted steam-tight in its cylinder or box, and its planed top bears against the face of the plate, *d*, in working. By this arrangement the slides are relieved from one-half the steam-pressure; and to assist the free exhaust, a port, *g*, is formed in the back plate, *d*, of one of the slides, to allow the escaping steam an additional exit through the piston and exhaust-ports of the opposite valve.

The expansion link, figs. 4, 5, and 6, is placed so as to admit of the very desirable point of lowering the boiler considerably nearer the axle than usual. Instead of connecting the link, *h*, immovably to the ends of the eccentric-rods, so as to rise and fall with them in reversing or modifying the expansion, it is here suspended at its centre by an eye, from the end of the slide-valve spindle, *i*, so that its weight is entirely removed from the reversing gear. The eccentric-rods, *j*, are jointed to the opposite ends of the link slide-block, which is made of increased length, so as to secure the steadiness and durability of the working parts, whilst the reversing lever, *k*, has only the weight of the eccentric-rod and slide-block to bear during the reversing movement. The engine-driver has thus a much lighter labour to perform, and a more correct action of the valves arises from the fixed link-centre.

The perforated steam-pipe is an old invention of Messrs. Hawthorn's, but is only now coming into general use. It is fixed into the smoke-box tube plate by a ferule like an ordinary tube, and extends nearly to the full length of the boiler, close to the top, and is perforated with a continuous series of narrow slits, to admit the steam into the pipe directly above its point of generation. By its adoption, dry steam is carried to the cylinders without having recourse to a dome or steam-chest, and the barrel of the boiler, therefore, presents a clear unbroken surface.

Whilst we are on the subject, it may be mentioned that Messrs. Hawthorn were the earliest introducers of the system of four fast eccentrics, this arrangement having been adopted in the "Comet," which was one of the two engines employed in opening the portion of the Newcastle and Carlisle line between Blaydon and Hexham. The other engine associated in the honours of the day was by Messrs. Stephenson, and had two loose eccentrics, with a striking clutch for reversing; but after this time all the makers at once adopted the four eccentrics. The common reversing gearing of the present day, was also introduced by them shortly afterwards in the "Tyne" locomotive for the same line. The "Hawthorn" has inside and outside framing throughout its entire length, the connection between the two being by double knee-brackets. The cylinders, guide-bars, pumps, and axles, and all the machinery of the engine, are fitted perfectly independent of the boiler, which is not put in its place until all the other details are completely erected.

PATENT OFFICES:

47 LINCOLN'S INN FIELDS, LONDON; 66 BUCHANAN STREET, GLASGOW; AND 20 ST. ANDREW'S SQUARE, EDINBURGH.

R. & W. H. HAWTHORN

Engineers, Newcastle.

Fig. 1.

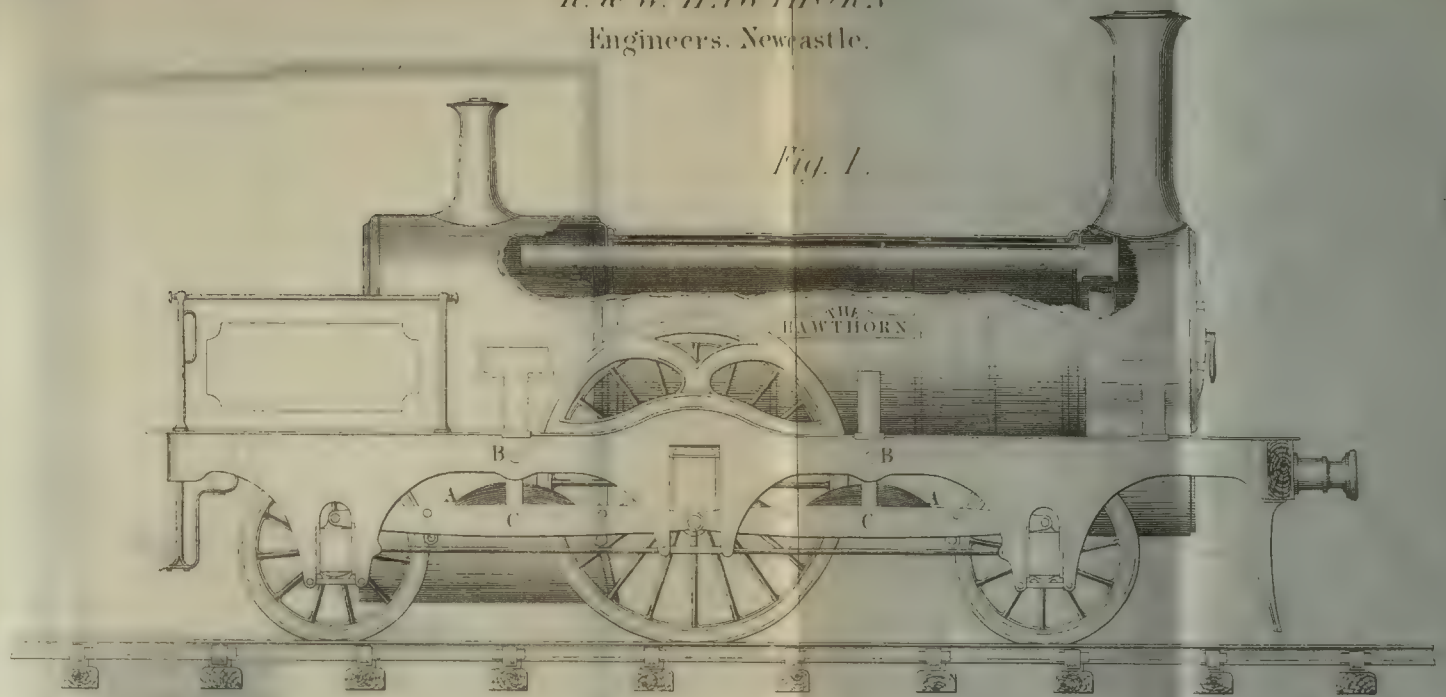


Fig. 2.

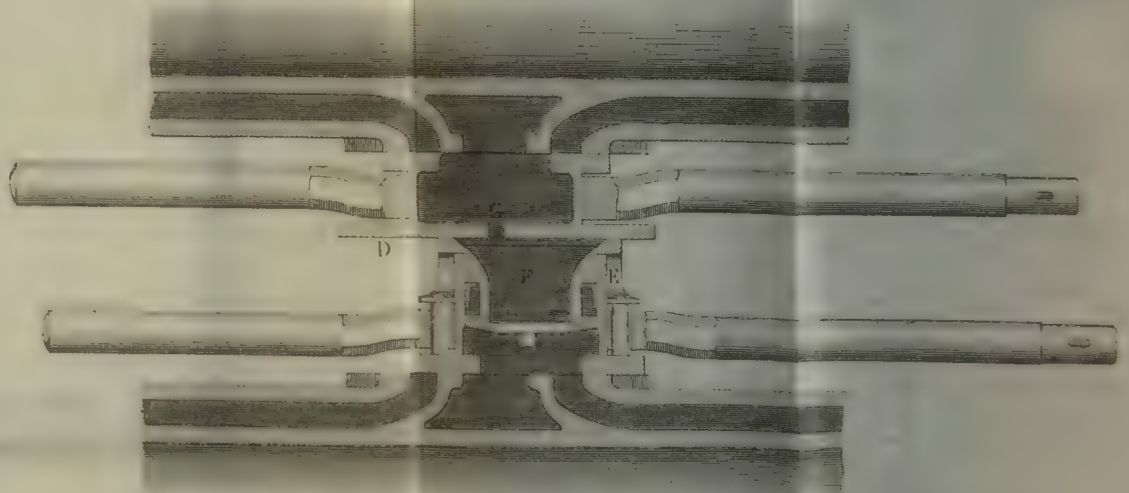


Fig. 6.



Fig. 4.

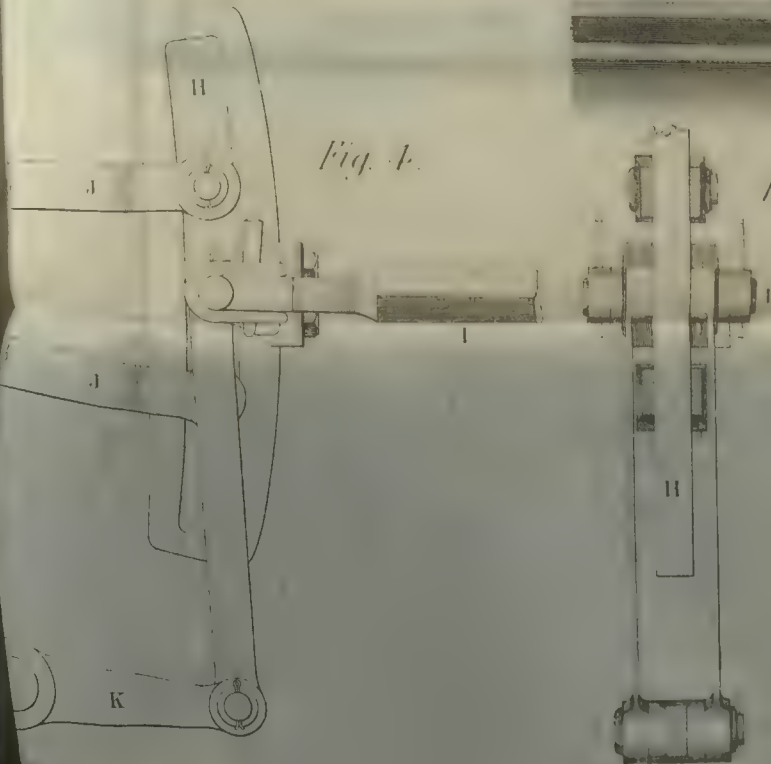
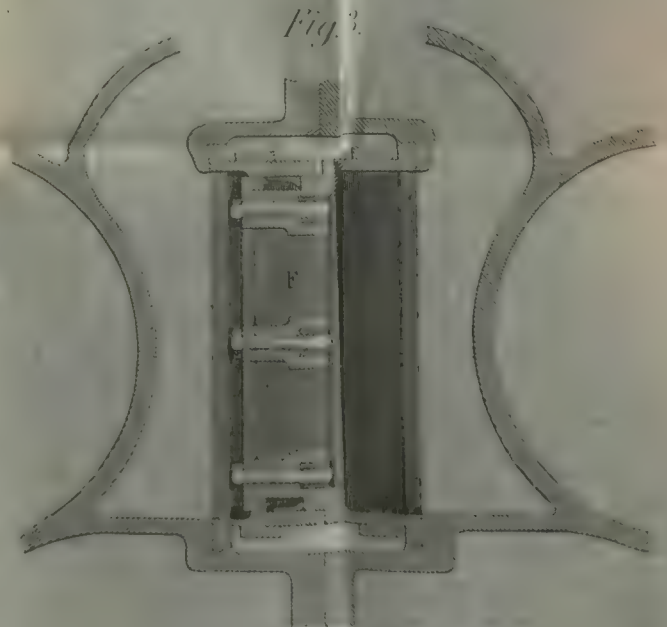
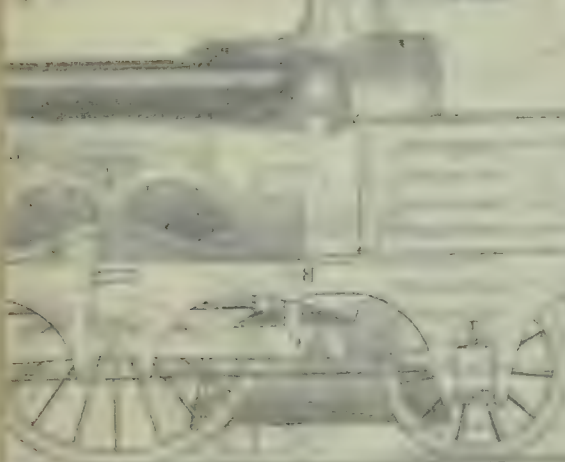


Fig. 5.



THE NEW ENGINE



arise from this...
moved during the...
We may remark...
required weight...
vertical...
no slide has...
no planet...
tight in its...



R. & W. HAWTHORN'S
 PATENT IMPROVEMENTS
 introduced into their
First-Class Passenger
LOCOMOTIVE ENGINE,
"THE HAWTHORN"
 sent to the
 GREAT EXHIBITION
 1851.

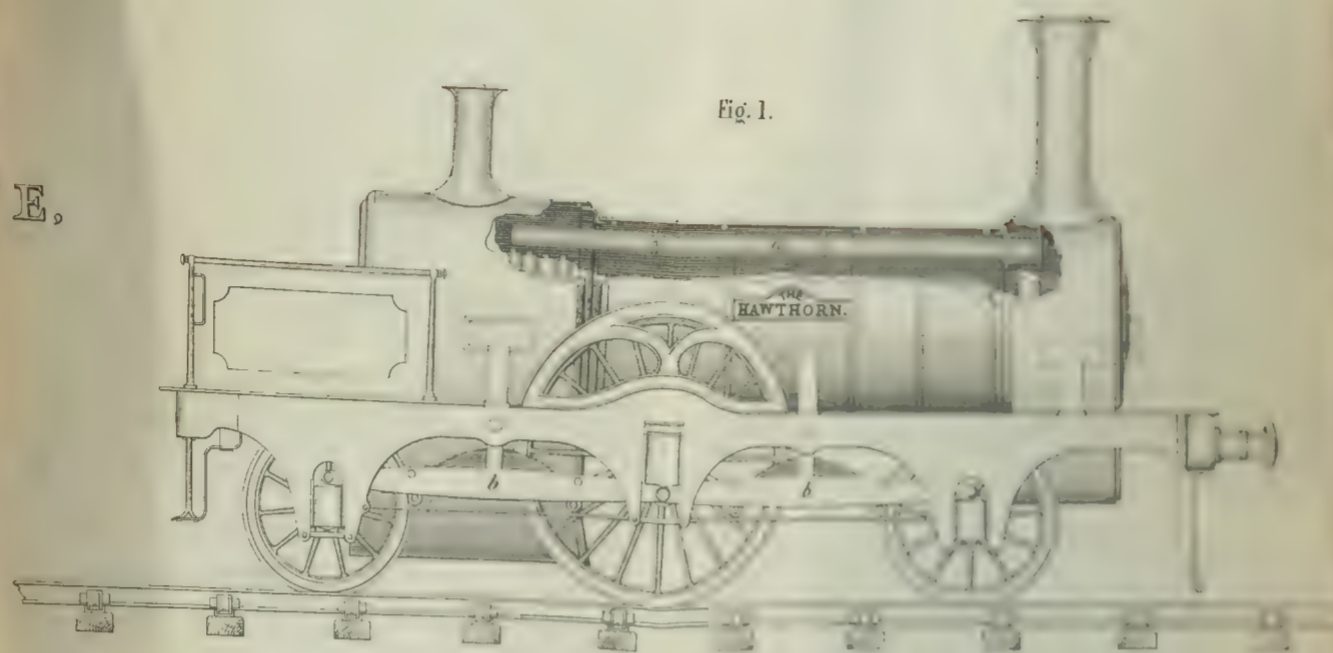


Fig. 1.

Fig. 2.

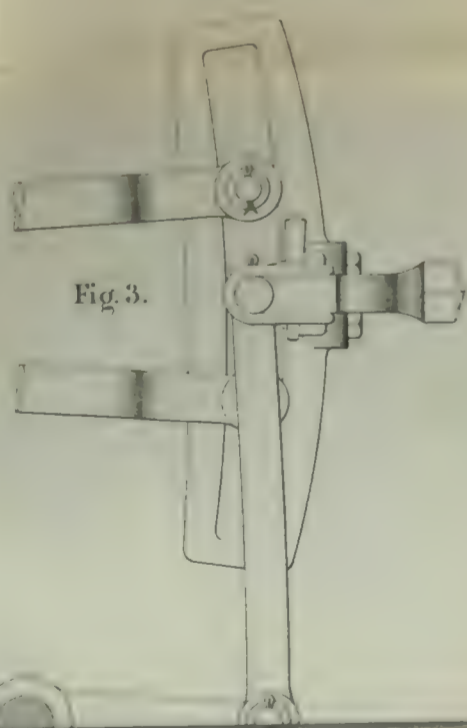
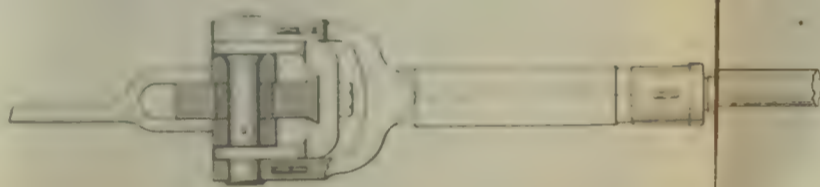


Fig. 3.

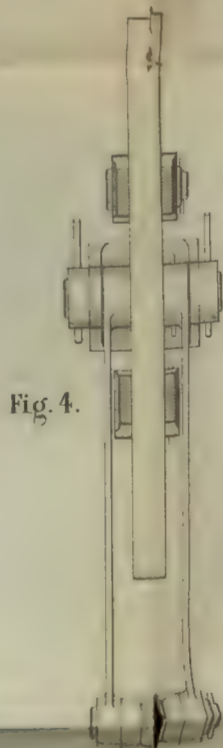


Fig. 4.

Fig. 5.

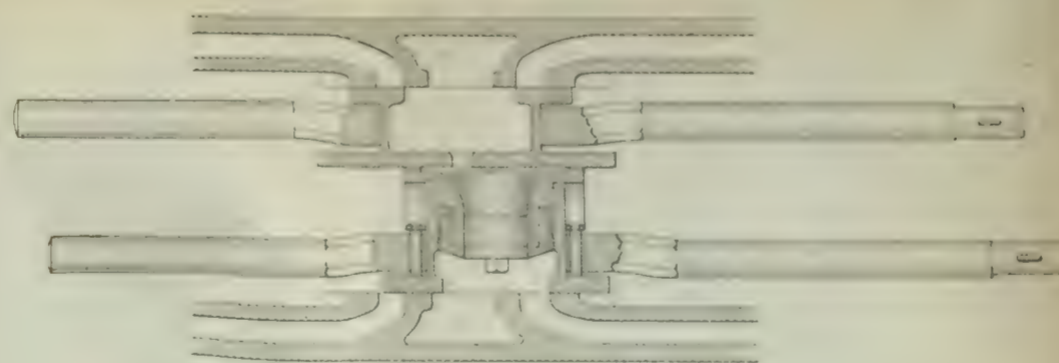
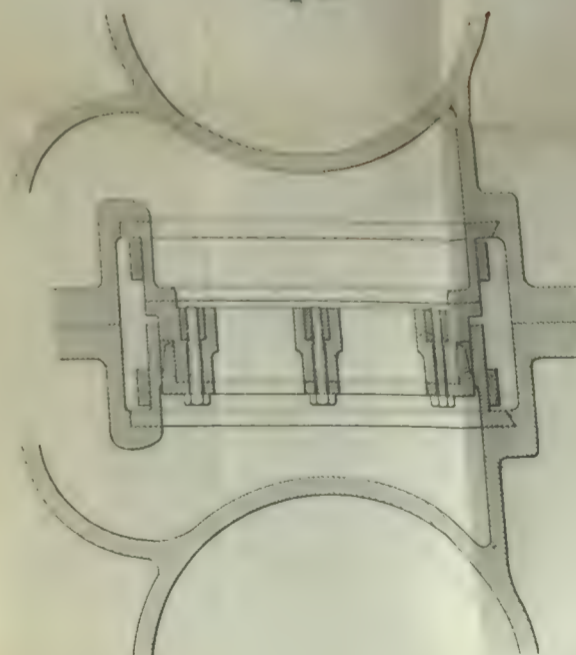


Fig. 6.



Description.

Fig. 1. Side Elevation, partly in section.

a. Represents R. & W. Hawthorn's Patent Steam Pipe.

b. & c. Their Patent double compensating Beams and Springs.

Fig. 2. Plan of their Patent Expansive Link.

Fig. 3. Side Elevation do. do. do.

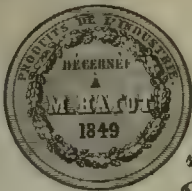
Fig. 4. End Elevation do. do. do.

Fig. 5. Sectional Plan of their Patent Slide Valves.

Fig. 6. Cross Section of do. do. do.

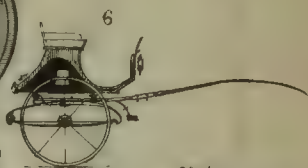
arriver
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de la Source
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un village
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FRANCE



VOITURE SYSTÈME

HAYOT



HAYOT Carrossier, Place Fontette 4-9, **CAEN** (Calvaados)
 du Gouvernement en 1848, Médaille d'Argent
 Exposition de Paris de 1849, et à celle de
 Lisieux de 1850.

HAYOT Coach maker, 4-9, Fontette Square **CAEN** (Calvaados)
 was honoured with a brief by the French Government
 in 1848, and received a silver medal at the exhibition
 of Paris in 1849, and at that of Lisieux in 1850.

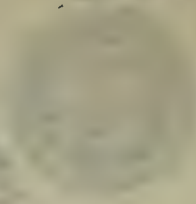
Avantages de cette Voiture sont :
 1. Cette Voiture à 4 roues, on peut obtenir instan-
 tement, en la divisant par le milieu une ou deux
 voitures à chacune 2 roues pouvant servir séparément.
 2. Lorsque cette voiture est à 4 roues, la couvrir
 ou la dériver qu'elle forme à la volonté des personnes
 qui sont mobiles, se transportant devant derrière,
 par le moyen d'un recouvrement en faire une voiture
 à deux roues devant et un grand coffre derrière en-
 fermé par un siège. Ce système se fait plus ou moins
 compliqué à la volonté de l'acheteur. Les modèles qui
 sont sur cette feuille sont une partie des formes qu'elle
 peut prendre. L'acheteur choisit toute forme qu'il veut. Le
 fabricant d'assemblage des deux parties, jete garantie
 pendant la durée de la voiture. 22 voitures de ce système qui
 sont en circulation me sont une garantie certaine de la
 durée. Cette voiture peut s'établir de manière à ne faire
 qu'une seule Voiture du derrière, sans en faire une de
 devant qui coûterait bien moins cher.

The advantages of this Carriage are.
 1. That out of a 4 wheeled carriage, can be obtained
 immediately, by dividing it in the middle, one or two
 vehicles with two wheels each of which a separate use can
 be made. When it is a 4 wheeled carriage it can be covered
 in any desired form; the seats are moveable, and can be
 placed behind or in front. By means of a covering a
 gig can be made with one seat in front; and with
 a large box behind, by suppressing a seat. This system
 is made more or less complicated at the will of the purchaser.
 The models on this sheet are a part of the forms that it can
 assume. Any form may be chosen at pleasure.
 2. I guarantee the system of the union of the two parts as
 long as the carriage lasts.
 22 carriages, on this system, which are in circulation,
 are for me a sure guarantee of success. This carriage
 can be arranged to act as to form one single vehicle with
 the hind part without making one with the front, which
 would be much less expensive.

Representatives in London chez M^r **VICTOR LESAUNIER**
 1 Little knight rider street,
 St Paul's Church yard.

Apply, at London, to
M^r VICTOR LESAUNIER
 Importer of French goods
 1 Little knight rider street,
 St Paul's Church yard.

STANLEY

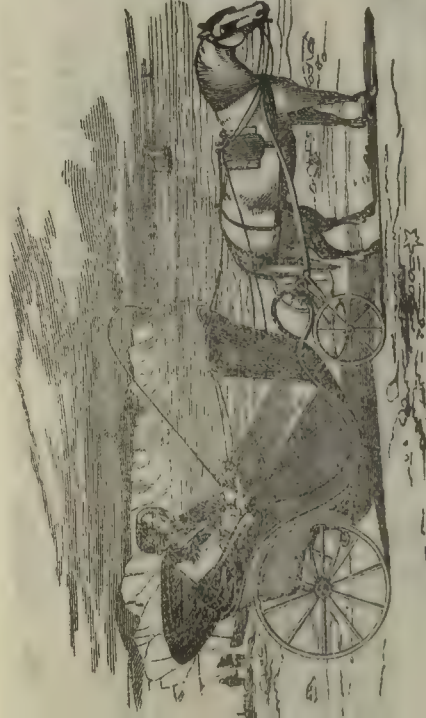


UNITED STATES

TOYAH

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[Faint, illegible text in the right column, possibly a list or report.]



Four-Wheel Albert Bath Chair, with Dash-Board and Shafts.



Light Park Chair, with Cane or Panelled Body.

HEDATHE'S

PATENT

BATH, MERLIN, AND SPINAL CHAIRS.



Heath's Patent Bath Chair, with Shut-up Glass Front.



Merlin Chair.

Manufactory, BROAD STREET, BATH.

DESIGNS AND PRICES POST FREE.

EVERY ARTICLE WARRANTED, AND EXCHANGED IF NOT APPROVED.

ВЪЗНЕСЕНІИ И СВЯТЫИ ДУХЪ
СВЯТЫИ ДУХЪ

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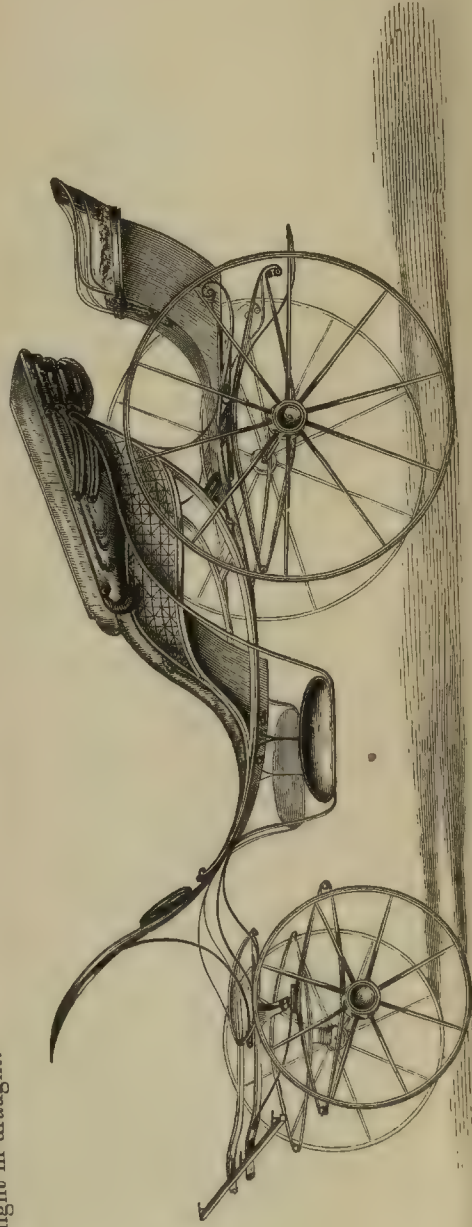


**HERBERT & ARTHUR HOLMES,
OF DERBY, AND 40, RUPERT STREET, HAYMARKET, LONDON;
COACH AND HARNESS MAKERS,**

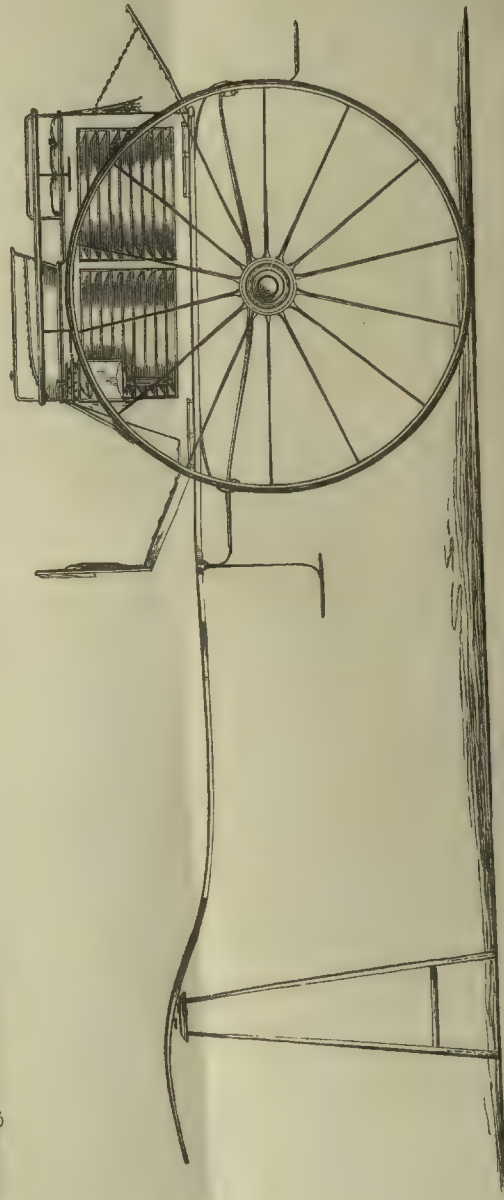
By Appointment,

TO HER MAJESTY THE QUEEN AND H. R. H. PRINCE ALBERT, &c. &c.,

HAVE the honour to exhibit at the Crystal Palace a light PARK PHAETON, of a style much approved by many of the Nobility and Gentry, with whose patronage they have been favoured. It is simple in construction, remarkably easy and light in draught.



Also, a DOG CART, or SHOOTING BUGGY, similar in outline to one H. & A. HOLMES had the honour to build some years since for H. R. H. PRINCE ALBERT. They have during the last ten years made many hundreds of these vehicles, and sent them to all parts of the Globe; the spacious boot, roomy seats, easy springs, high wheels, light running, and moderate cost, making them suitable for so many purposes.



THE CARRIAGE MANUFACTORY OF MESSRS. HOLMES, OF DERBY.

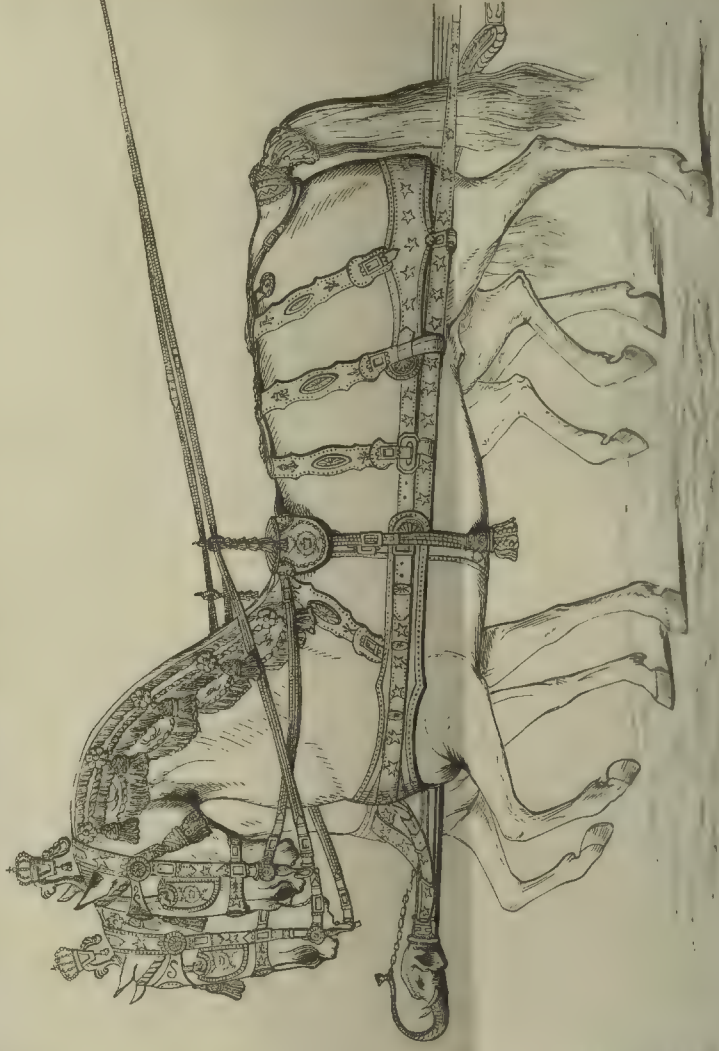
EVER since Mr. Stephenson's first locomotive engine was tried, on a short colliery railway, near Newcastle, in July, 1814, the minds of all classes of the community have been busily contemplating the good which has resulted, and which may result, from the substitution of mechanical for animal power in our internal communication; and, as the comfortable and independent travelling chariot and cozy stage coach gave way to their more capacious and expeditious rivals on the rails, the interest previously attached to road carriages gradually subsided. In our opinion, however, there is much that is artistic and ingenious in the graceful outline, the elegant interior, and the highly mechanical construction of many of the vehicles still drawn by horses, and it has long been our wish to investigate the various processes by which they are manufactured, and the progress made therein up to the present time, and to put our readers in possession of such information as we might find worthy of gratifying this desire was afforded us, a few weeks since, at Derby, where a gentleman volunteered to introduce us to the Messrs. Holmes, proprietors of, perhaps, the most extensive and complete private carriage-manufactory in the kingdom. Of their premises, machinery, various classes of artisans, materials and productions, it is now our intention to give such a description as our limited space will permit. The entrance-yard, which is about 300 feet long, rises gradually from the street, and is neatly paved; the show-rooms and workshops, two stories high, are built round it; the windows are large and numerous, and the walls are painted white, to reflect the light; at the top is a large clock, which can be seen from every workshop, and through the walls in several places project the screwed ends of high-pressure water-pipes, to which may be attached either large hose in case of fire, or small flexible tubes for washing the dirt from carriages without injury to the paint. On each side of the yard is an inclined plane of wood, up which carriages are raised to the higher story of the workshops or show-rooms, by means of cleverly constructed pulleys. After inspecting two or three curious old vehicles, and some large piles of dried timber of various kinds, in one of the lower buildings, we ascended, by a staircase which formed the centre of an incline, to the room above. In it forty or fifty second-hand carriages are arranged for sale; the wall, at one end, is occupied by rolls of floor-cloth, kept to shrink before use; and at the other end, wide folding-doors open into the seasoned timber-store, an extensive, well-ventilated place (aired, in winter, by steam pipes) containing large quantities of heavy plankings and wood artificially bent, over which, in the roof of the building, are broad racks reaching one hundred and fifty feet in one direction, and fifty or sixty feet in another, full of dry boards. The timber used in carriage building is mahogany, cedar, pine, teak, gany, lancewood, American birch, ash, and elm,—English oak, ash, elm, sycamore, and poplar; and all these in their full growth, cut to various thicknesses according to their uses, weathered in the air, and dried in open sheds, had eventually been deposited here ready for the workmen's use, almost without any further or unnecessary care. This store is separated from the body-makers' shop by a partition, in which an experienced person is stationed, whose duty it is to select and mark out suitable work to use, with the ordinary saws, and deliver it to the respective workmen. Before proceeding further, it is well to observe that, in coach-making, a greater number of different trades, or rather crafts, are combined, than in almost any other business: coach body-makers, carriage-makers,

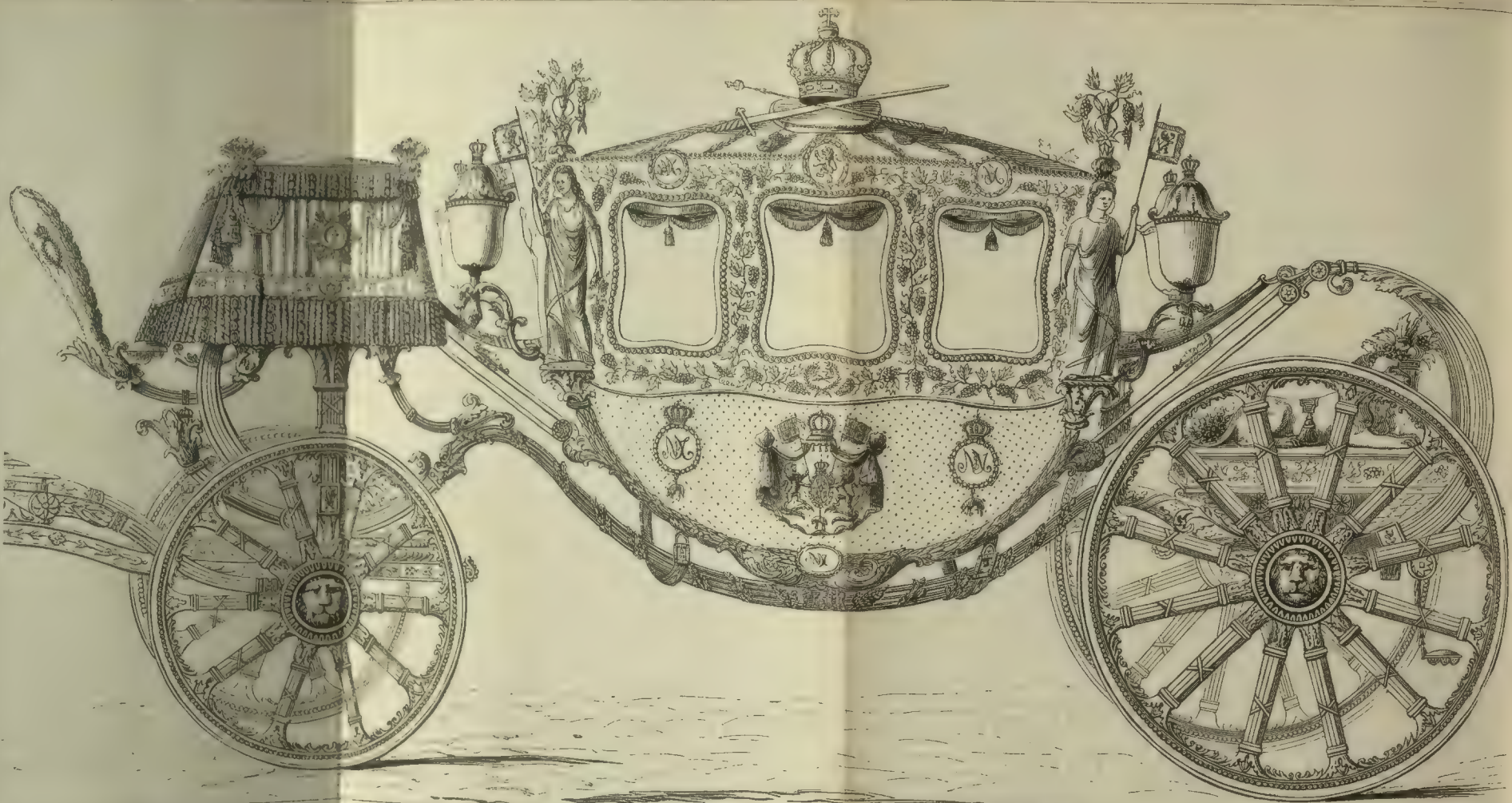
wheelwrights, wood-turners, joiners, sawyers, smiths, axle-makers, spring-makers, trimmers, brace and harness-makers, panel-painters, carriage-painters, heraldry and ornamental painters, lamp-makers, as well as designers and draughtsmen, in all sixteen classes of artisans, jointly numbering about one hundred and fifty, employed on the premises we are describing: these classes are again subdivided; for instance, the smiths have fitters and hammermen, the carriage-makers, framers and carvers, &c., so that there is an extensive division of labour. We believe, however, that very few coachmakers carry on as many branches of their trade as we have here enumerated; yet the Messrs. Holmes assert (and we think with truth, from the firmly-framed and beautifully-proportioned work we saw in progress) that they possess immense advantages over those ostensible coachmakers who employ piece-masters to build or complete various parts of their carriages; piece-masters being small tradesmen, who carry on one branch of the business only, and have, in many instances, a very limited stock of materials to work upon.

But, to continue our description. The body-makers' shop is a well-lighted room, one hundred and thirty feet long, having substantial workbenches arranged down one side, and numerous large, black drawing-boards, about twelve feet long and nine feet high, down the other; on these boards the full-sized design of a carriage is first drawn in chalk, according to the requirements of the person ordering it; wood patterns are then fitted to the curved lines, and by these patterns much of the carriage is built, the drawing being a guide to each artisan throughout. The frame-work of carriage-bodies is always constructed of English ash, of a light nature, put together in a skeleton form; the panels, of Honduras mahogany, are fitted into grooves made in the framing, the floors and footboards of pine and elm are screwed into rabbets, and the roof, if the carriage be close, is covered with light pine boards; a large wet hide of undyed leather, called russet leather, is then placed upon the roof, and down the sides and back of the body as low as the centre; this is moulded, by pressure, exactly to the form of the roof and panels intended to be covered, and when dry is painted and japanned.

About fifteen, or twenty bodies, of various forms, were being built in this room, and the framing of each exhibited much ingenuity and mechanical skill; we were especially pleased with a mode adopted here of securing the edge-plates of iron, which strengthen the doorways and sides of bodies, whereby a plate, one-eighth of an inch thick, is rendered as efficient as a plate three-eighths of an

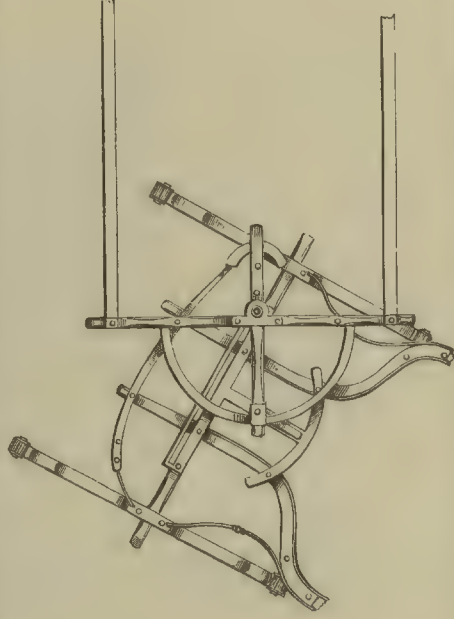
inch thick fixed in the ordinary way; lightness is very much studied, and, each piece of framing, whilst it forms or continues some elegantly curved line, is mechanically combined with the other framing, in such a manner, as to take part of the strain and add to the general strength, without increasing the weight; amongst many very light carriages, we saw a private omnibus, constructed to carry fourteen persons, and which, when quite complete, weighed only ten and a half hundredweight. Several arrangements in the bodies here building were entirely new to us; a Clarence had the windows balanced by weights, so that they moved with the slightest touch, rested where placed, and required no pulls or holders; a Brougham had part of the roof constructed to open, that persons riding in it might stand up, if so inclined; a Park Phaeton, (See our last cut page 384) had a very cleverly contrived knee-boot, invented by Anthony Strutt, Esq., of Millford, consisting of two light flat frames, paneled on the top and hinged together, to which leather sides were attached; it was self-folding, allowed abundance of room for the knees, was waterproof, and could be closed or opened instantly. A kind of inside car suggested some years since by Robert Arkwright, Esq., of Sutton, (See the second cut page 384) appeared to us to be a very light and comfortable vehicle for country use; it can be built to carry two, four, or six persons, besides the driver. Indeed, each piece of work displayed some points of excellence, either in the construction or appendages, but our space will not permit us to describe more of them. The roof of this building was filled, from end to end, with dry boards; the floors, walls, and windows were remarkably clean, and near the door was several plate, heated by waste steam, in which were several bright copper kettles for making glue, paste, and anti-attribution; attached to these were valves, for turning the waste steam, when required, through pipes, which warm a large portion of the manufactory. We now descended to the carriage-makers' shop, a room very like the one just described, but situated on the ground-floor. The frame-work of a carriage (which coachmakers understand to mean all that framing below the body designed to connect the springs, axles, body, pole or shafts, according to the construction of the vehicle,) is of stout-natured ash, firmly framed together, gracefully swept, and, when duly plated with iron, is always neatly, and sometimes elaborately carved: the "lock" (that part of a carriage which regulates its facility of turning) requires to be very judiciously arranged, and, since low vehicles have become fashionable,





much attention has been paid to it, with the view of making short carriages, having bodies near the ground and high front wheels, turn well, in narrow streets. Several plans for attaining this desirable result were shown to us; one, invented by Messrs. Holmes, was particularly simple and effective; and another, first introduced by them into England, and patented by Mr. Buchanan, of Glasgow, was very ingenious. It has two bolts, or pivots, which slide in grooves in the lower forecarriage, causing the wheels to turn well under the front seat, without approaching much nearer the body; the outline on next page will convey an idea of it. Nearly seven years since the proprietors of this establishment determined to erect a steam-engine, feeling satisfied that the labours of the skilled artisans they employ might be materially lightened, and their work, in many instances, finished with greater accuracy and expedition by the assistance of machinery; fashion, however, so frequently changes the outline of carriages, that their first object was to decide upon which parts it could be most advantageously employed, and their next, to contrive suitable machines;—the success which has attended their various projects will appear as we proceed. The steam-engine, a very compact, high-pressure one, of fifteen horse power, is in excellent order, and the room it stands in particularly clean; attached to it is a powerful pump, which supplies the whole premises with water, and is capable of raising 300 gallons per minute. The boiler-house is below, and adjoining it are the coal-cellars, also a depository for the bark of trees, refuse pieces of wood, shavings and sawdust, which serve, in some degree, to economise the fuel required by the boiler-fire.—The joiners' shop is light and well arranged, and their work is much facilitated by circular saws. The wheelwrights' shop is capacious, and contains eight work-benches, with a corresponding number of pits, or excavations in the floor, wherein wheels revolve as they are framed. A carriage-wheel ought to be fitted together with great truth; it should be firm and solid in its joints, though slightly elastic from its conical form, and strong from the combination of its parts, though light in weight and appearance; the nave, or centre, should be of elm, the spokes, or radiating bars, of cleft oak-sapling; the felloes, or segments forming the rim, of tough ash, and the hoop, or tyre, of iron. Passing on to the machine-shop, our attention was first directed to a circular saw-table, having two apparatuses, one for cutting tenons, and the other for squaring the ends of felloes, and regulating their length according to the circumference of the wheels for which they are intended.—the gauges for which are very nicely contrived. A large circular saw-table, used for general purposes, has also a sliding gauge, with spindle attached to it, on which navies, and other round pieces of wood, can be prepared for the lathe, in a true and an expeditious manner. A narrow upright very sensitive lathe, in which the work is cut by a circular curved timber, works upon a sliding rest, and is guided by a fine chalk, or pencil line, from sawdust, as the timber is pressed forward. The felloe-machine is very ingeniously arranged; two rough pieces of wood are placed in it; the indices are set to similar or differing sizes, as the workman may desire, and two felloes, perfectly true and beautifully curved, are produced in a few minutes. A boring-machine has disk-plates attached to it for driving felloes for the dowels and spokes, and navies for the spokes, according to the number to be inserted in them. A long powerful lathe has all necessary appurtenances for turning both in wood and iron. The boring-engine is so adjusted that it would be difficult to let an axle-box into a nave otherwise than true with the face of the wheel, and exactly in its centre; this

engine must be a most valuable auxiliary to a coach-maker who desires to make his carriages run lightly and quietly. The heavy shears will sever a bar of iron, two inches square, and they are placed near to a bending machine, which may be gauged to bend any thickness of tire-iron to any diameter of wheel, with great precision; and, what is more essential in securing a



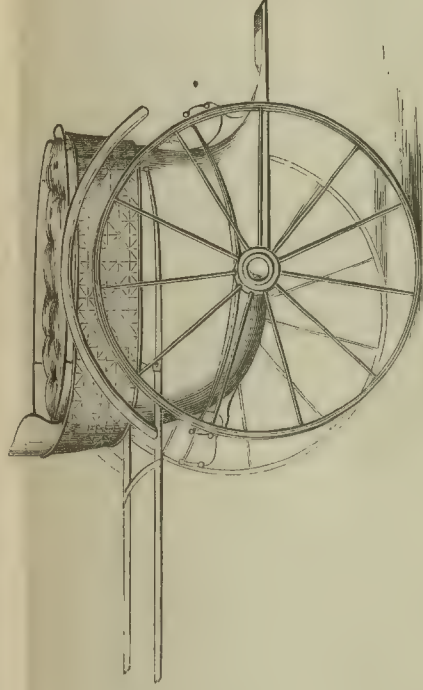
sound type, it compresses the inner surface of iron and extends the outer one equally throughout. But, perhaps, the most scientific piece of mechanism is the spoke-machine, which will produce from 300 to 500 perfect spokes per day; the arrangements for graduating their sizes are extremely simple, and the spindles by which they are formed revolve at the extraordinary speed of 5000 revolutions

per minute! Grind-stones turning, at various speeds, some for grinding tools, and others for grinding steel and iron-work, a drill, a punching-machine, a tapping and screwing engine, and a large fan for blowing the smiths' fires, are adjuncts to the steam machinery in this shop, and are arranged in the usual way. On entering the first smiths' shop, which is nearly one-hundred-and-forty feet long,

has a water tue-iron, a blast-pipe, a pair of bellows, a stake-trough, a pair of large vice, and gas-light, and it will hold a day's supply of coke; the tools belonging to each are kept in excellent order, and arranged, with much neatness, in long racks on the walls; the front of the shop is occupied by fitters' benches, which have every necessary appendage, and are well lighted by large glazed windows. No

were at work, whose operations it is unnecessary to describe. Passing on to the trimmers' loft, we were pleased with the taste displayed by these carriage upholsterers, and with the excellent materials they were using; attached to this branch of the business is a power-carding machine, employed for opening the curled-hair stuffing of carriage linings, when under repair, and cleaning it effectually from the moth and dust. The three painting lofts are spacious, and scrupulously clean, and, though the temperature is necessarily high, the atmosphere is rendered peculiarly fresh and wholesome by a fan, which withdraws the impure air, and any particles of dust that may arise, and discharges them above the roof. The revolving trestles, on which bodies are placed to be painted, and the other utensils required in these shops, are appropriate and convenient. Carriage-painting is a tedious and an expensive process. When a carriage-body is finished by the maker, it receives three coats of lead-coloured paint, and five or six coats of filling-up stuff; the panels and mouldings are then rubbed down with pumice-stone and water, until a face is obtained almost as level as polished marble; four coats of oil-colour follow; between the last two all slight indentments not previously filled up are stopped with a kind of hard putty, and the surface is again rubbed smooth with pumice-stone; four coats of the finishing colour are then laid on and five coats of copal varnish, (between each of which the body is flatted down with fine pumice dust, flannel and water) complete the operation. The wheels and underworks do not receive so many coats of paint and varnish as the bodies, yet the numerous relief lines now fashionable, require that a great amount of skill and labour should be expended upon them. The heraldry we saw was very beautifully executed, and gave us a high opinion of the ability of the artist employed here. The painters' store-room, situated in the centre of the lofts, is under the care of a person whose knowledge of chemistry enables him to judge of the quality of colours, and to mix them in such proportions and combinations as are most likely to prove permanent; his room is thoroughly ventilated by the fan before alluded to, and his labours are considerably lessened by two grinding-mills, driven by steam power. We had almost forgotten that there is, amongst the machines, a small lathe, arranged for making a kind of frost-chisel and stud, which may be screwed into the winter shoes of horses, and changed, (the studs for the chisels, when the roads are icy, and vice versa) when they become otherwise) without removing the shoes; the increased safety and comfort afforded to horses by these chisels, if really well made and fitted, will be apparent to every one.

This large manufactory, which occupies nearly two acres of ground, is, of course, supported by a very wide-spread connection; we saw carriages and cases of saddlery, packing for Malta, India, and Australia, whilst others were making for parties here, whose names give weight to works of taste and ingenuity. The Messrs. Holmes have been honoured, too, with warrants appointing them coach-makers in ordinary to Her Majesty the Queen (for whose use at Osborne they are at present building a handsome light Clarence), to His Royal Highness Prince Albert, and to the late lamented Queen Dowager, and we were informed that they had the gratification of building the first travelling carriage for the establishment of His Royal Highness the Prince of Wales. That the Messrs. Holmes are practical coach-makers, thoroughly conversant with every process of carriage construction, is sufficiently shown by the number of branches they carry on, as well as by the extensive patronage they receive; and, that they have considerable mechanical knowledge, is apparent from their varied and clever machinery; but what chiefly interests us, and is decidedly essential to their prosperity, is, that, possessing a keen eye and a fine taste, they are enabled to execute judiciously in the work of their most graceful productions. We obtained permission to copy a state coach designed and drawn by Mr. Arthur Holmes, which we think exhibits a great degree of taste and skill in British Industrial Art we do not recollect having ever enjoyed a more unexpected treat than was afforded us on the day we inspected these premises, and we cannot refrain from remarking that the highly respectable bearing of the artisans (many of whom had held their situations from thirty to forty years,) the regularity with which they carried forward the productions, added many charms to the pleasant hours we spent here, and spoke volumes in praise of the work which should emanate from such willing hands, ably directed, and impelled by but one desire—the attainment of professional eminence. It is always peculiarly gratifying to note such facts as these.



smiths' shop contains two large ovens, an oven for heating tires, and a concave cast-iron fitting-plate six feet in diameter, for truing them upon: when a tire is welded up to a proper size, which is something less in its inside measure than the entire circumference of the wood-work of the wheel, it is set true, and put in the oven; the wood-wheel is then screwed down to the fitting-plate before



we were much struck with its light and cheerful appearance: the forges, eight in number, are built along the back; at the side of each is a flagged level, eleven feet square, which is a great assistance to the workman in setting true the axles and tortuous stays of carriages; it also affords him the advantage of having the frames of bodies and carriages near his anvil whilst he plates them. Every hearth

mentioned, the heated tire placed round it, and the plate, wheel, and tire descend into water: when the wheel is released it is found to be tightly bound together; by these means truing is done with great truth and celerity. After walking through the large and well filled timber-yard and sheds, and the iron and steel stores, we ascended to the harness-makers' loft, where a number of men

54, King Street
Manchester

1835

Sir,

I beg leave to submit for your consideration a partial description of my Patent improvements in the method of Lubricating Machinery.

The principle you will at once see is capable of very extensive and varied application, respecting which I shall be happy at any time to furnish you with further information.

I am Sir,

Your most obedient servant,

J. C. Murray

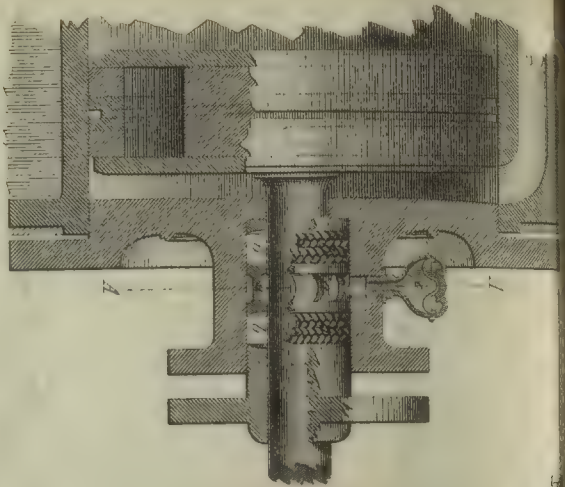


Fig. 2

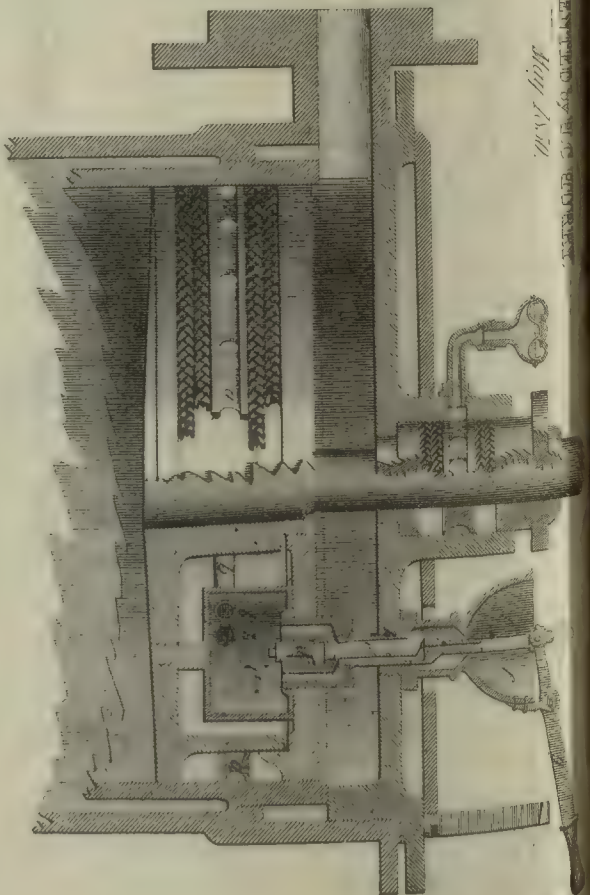


Fig. 6



Fig. 3

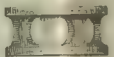


Fig. 4



Fig. 5



Fig. 7

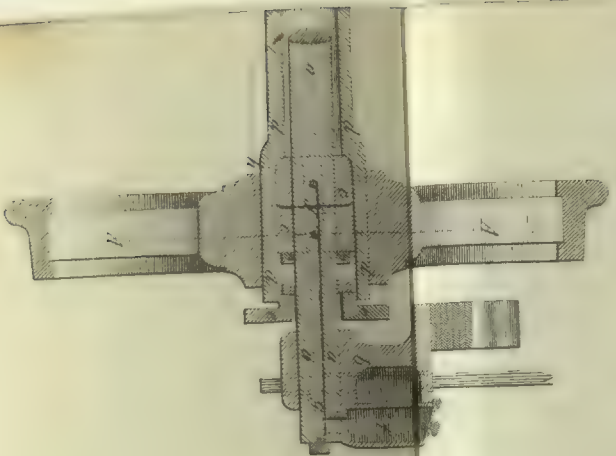


Fig. 9

The object of these improvements is to secure the most perfect lubrication of the parts to which they are applied without any waste of the lubricating material. By this is obtained greater efficiency combined with very considerable economy, both in power by the reduction of friction and in material by the prevention of waste.

The annexed drawings explain some application of the principle. Fig 1 is a longitudinal section of the cylinder of a locomotive; Fig 2 is a cross section at A A. Fig 1, a, a is a piston tank or hopper placed within the stuffing box, with packing B B on each side. This hopper will be better understood by referring to Figs 3 & 4 the former being a side view, and the latter a horizontal view, partly in section. By this tank a supply is preserved around the piston rod, which by means of the grease cup C may be kept constantly filled with oil or grease, the cup has a valve led kept closed by a tight spring, to exclude the dirt, and prevent the escape of grease. It will be seen that by this arrangement the grease is brought into contact with the rod for its whole circumference, and that it can only escape after performing its office of lubrication by passing through the packing. Fig 3 is a sectional view of a portion of the cylinder of a stationary engine, showing the application of my improvement to a horizontally packed piston. Fig 6 is a partial horizontal section of the piston; A A is the tank or hopper, exactly similar to that before described, but of a size proportional to the part to which it is applied; it is supplied with oil or grease by means of the tube D, the piston chamber is furnished with a stop cock at the interior of the plug of which it is made square, to let the end of the tube E, the top of this tube is made to fit a valve seat on the bottom of the grease cup F, so that when raised by means of the lever G it will stop the communication between the grease cup and the interior of the cylinder; the tube E in running is caused to turn partly round by means of a stud on its rod, working in a shield groove, shown in detail at H. Figs, in consequence of its lower and long square, it communicates a lateral motion to the plug of the stop cock D and so shuts off the communication between the chamber C and the upper portion of the cylinder in which piston it is when the engine is worked. The position of the piston shown in the drawing is that effected for charging the chamber C with lubricating material when necessary. Another means of effecting this is by a hole drilled lengthwise on the piston rod, with a grease cup such as F. Fig 1 is the cross head and another made into a piston journal which I have not considered it necessary to show and which is used in horizontal cylinders. In metallic packing it is necessary to have two rings of packing on each side of the hopper so as to keep joint, but in present metallic pistons, the centre packing ring is grooved instead of the in production of the hopper as shown in fig 1. Fig 7 is a section of a railway carriage wheel I think appertaining and Fig 8 is a partial cross section of the same at A A. Fig 7, showing one modification of my improvement, a, a is an axle flange at each end to the splines. Block B and does not revolve. C, c are brass or other metal steps placed thereon, upon these hollow axle is closed by means of a little packing & a gland which being on to it, the ends of the hollow axle are closed by means of a little packing & a gland thus forming a chamber for the lubricating material which is supplied to it by means of the grease cup F, the hole G drilled in the flange axle. By this mode of lubricating I am enabled to employ a form of axle which delivers the load to the revolving parts immediately over the point of bearing, so preventing all strain of the revolving axle at the point R which proves so destructive to those now in use.

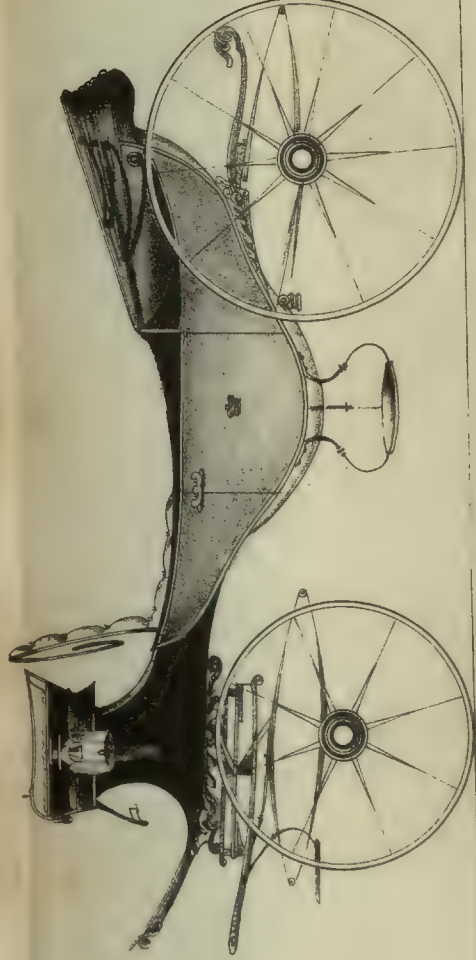
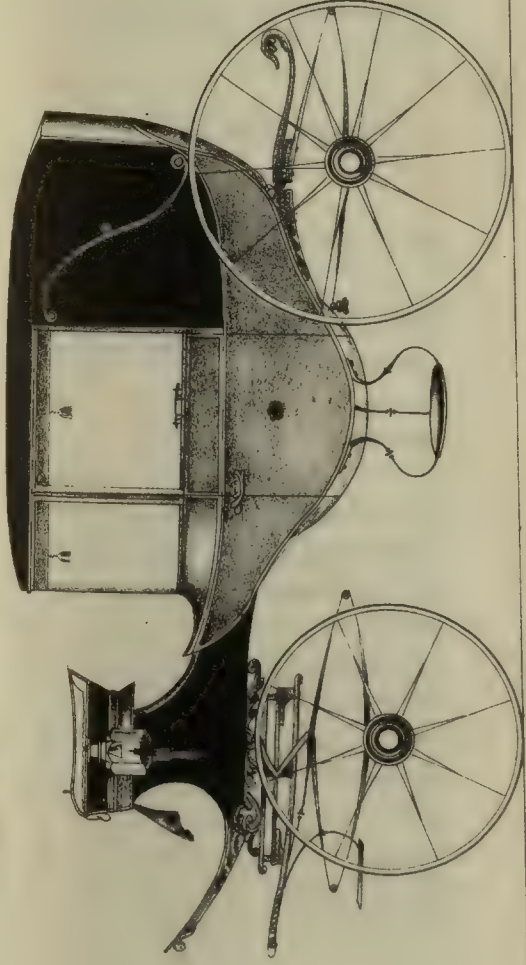
Rate of Royalty.

*In the whole remaining term of the Patent,
charged upon Stationary & Marine Engines,
the power being in one Cylinder:*

not exceeding 10 Horse Power		£	s	d
		5	0	0
10 and not exceeding 15		7	0	0
15	20	8	10	0
20	30	11	5	0
30	40	13	15	0
40	50	16	0	0
50	60	18	0	0
60	70	19	0	0
70	80	21	0	0
80	90	22	10	0
90	100	23	10	0
100	120	25	10	0
120	140	27	0	0
140	170	28	10	0
170	200	30	0	0

For every additional 10 horse power to 500. £1.0.0
1000 --15.0

H. C. Harry



Edwin Westerton begs most respectfully to announce that he has succeeded in introducing an entirely new description of Carriage secured under the new designs act (P.S.) Oct. 5 1855 combining in the most complete manner the Open & Close Carriage in one; the transformation being so simple that the most inexperienced person may effect it with perfect ease.

The above sketches represent the Ammerton forming the two complete Carriage; it has also the advantage of being much lighter in appearance and draught than any carriage yet introduced.

E. W. most respectfully solicits an inspection of the Carriage at his Manufactory, 50, Long Acre.

ACADÉMIE ROYALE DES SCIENCES.

Extrait des *Comptes rendus des séances de l'Académie des Sciences*, tome XXIV,
séance du 26 avril 1847.

PRIX RELATIFS AUX ARTS INSALUBRES.

EXTRAIT DU RAPPORT

SUR

LE CONCOURS DE L'ANNÉE 1845.

Commissaires, **MM. Dumas, Chevreul, Rayer, Pelouze, Poncelet,**
Payen rapporteur.

« La Commission a trouvé un objet digne du prix Montyon dans les moyens de sûreté proposés par M. **LAIGNEL** et appliqués aux chemins de fer; elle avait réclamé l'adjonction de l'un de nos confrères compétents dans cette matière, et ce fut effectivement avec le concours de M. Poncelet qu'elle a discuté et unanimement voté la proposition qui vous est soumise.

» Ce sont les motifs exprimés par M. Poncelet que je vais avoir l'honneur de communiquer à l'Académie.

» Les membres de l'Académie ont pu remarquer, dans plusieurs circonstances, que M. Laignel est un homme fort ingénieux, à idées simples, mais utiles et fécondes; il s'est principalement préoccupé des moyens d'assurer la vie des voyageurs contre les accidents si fréquents et si déplorables survenus sur les chemins de fer : son système de parachoc ou châssis à câbles propres à amortir, par la rupture successive de ces câbles, l'intensité des forces vives à la rencontre des convois (1); le dispositif original par lequel il

(1) Ces parachocs sont d'une efficacité entière et réelle; ils remplacent les tampons qui n'ont aucun effet utile, qui sont toujours ou trop forts ou trop faibles, et n'empêchent point

s'est proposé de neutraliser les effets de la force centrifuge dans les tournants et croisements de chemins de fer, dispositif qui a déjà valu à M. Laignel un prix décerné en 1839 par la Commission des arts dangereux ou insalubres (1); toutes ces combinaisons, auxquelles il faudrait joindre celle qu'il a proposée en vue d'éviter les accidents provenant de la rupture des essieux, offrent autant de preuves de ce qui vient d'être avancé relativement à son esprit inventif (2).

» Aujourd'hui, la Commission chargée de décerner le même prix a jugé qu'il y avait lieu de récompenser plus dignement encore le système de frein pour lequel M. Laignel s'est fait breveter dès le mois de mars 1838, et qui a rendu de si grands services à la descente du chemin de fer d'Ans à Liège (3).

» Le système ordinaire, ou ancien système, consiste, comme on sait, à

les voitures de se *mater* l'une contre l'autre et se surmonter, et par là causer leur destruction, en même temps que des contusions et trop souvent la mort; ces tampons présentent encore une économie de 75 pour 100.

(Note de M. Laignel.)

(1) Ce dispositif permettrait des vitesses de 36 à 40 kilomètres à l'heure dans des courbes aux rayons de 50 à 60 mètres, même sans accotoir au rail extérieur et sans dérailler notwithstanding des obstacles de plusieurs centimètres sur les rails. On obtient une force centripète bien supérieure à celle centrifuge; l'intérieur des voitures est disposé pour que les voyageurs n'éprouvent aucun lancement latéral. Les rues des villes de Philadelphie, Baltimore, etc., sont traversées par des courbes aux rayons de 15, 20 et 25 mètres. Les négociants chargent leurs marchandises dans leurs magasins et les font arriver sans camionage au grand chemin de fer. (LE CHATELLIER, ingénieur des mines.)

1838. *Ponts et Chaussées de France*. — Le système Laignel peut être très-utile dans beaucoup de cas; il ne faudrait pas hésiter à l'appliquer dans toutes les circonstances où la configuration du terrain exigerait de très-fortes dépenses pour l'établissement des courbes à grand rayon, et toujours dans le cas où l'on est obligé de modérer la vitesse, comme aux points de départ et d'arrivée (les stations), à la rencontre des croisements de voies et de gares d'évitement, ainsi que celles de chargement et déchargement, et même lorsqu'il s'agira de raccorder une ligne d'embranchement sur une ligne principale.

1839. *Ponts et Chaussées de Belgique* (Rapport à M. le Ministre). — Il résulte, des expériences faites sous les yeux de la Commission et dans les circonstances notées au procès-verbal, que les courbes à petit rayon (système Laignel) peuvent être parcourues par des convois chargés et composés d'un assez grand nombre de wagons avec de grandes et de petites vitesses, sans que de la petitesse de courbure de rayon paraisse provenir aucun inconvénient, les voitures tendant constamment vers le centre.

On remarque, à la suite de ces expériences, que le rail intérieur des courbes a subi une très-forte pression à la partie en contact avec les rebords des roues. (Note de M. Laignel.)

(2) Les essieux durent bien plus longtemps et préviennent tout contre-temps causé par leur rupture.

(Note de M. Laignel.)

(3) Et même sur le plan incliné d'Aix-la-Chapelle, et horizontalement entre Liège et Verviers (Prusse).

(Note de M. Laignel.)

arrêter les roues de la locomotive ou des wagons, par une transmission de leviers plus ou moins énergiques, et à obliger ainsi ces roues à glisser sur les rails, par un frottement de première espèce, incomparablement plus fort que celui de roulement ou de seconde espèce. Mais ce procédé a le grave inconvénient d'occasionner une assez forte perte de temps, de provoquer le prompt et inégal usé des jantes de roues, et de ne point offrir toute l'énergie et les garanties de solidité désirables.

» Le frein de M. Laignel n'offre pas, à beaucoup près, les mêmes inconvénients : il se compose de deux *sabots* ou *patins* en fer occupant une partie de l'intervalle des roues consécutives, ayant la forme renversée des rails, et munis de rebords latéraux intérieurs; ce couple de sabots, relié solidement au châssis des brancards par un système de traverses et étriers en fer qui le guident, est abaissé parallèlement, au moyen d'une vis verticale, mue par une manivelle montée sur le plancher du wagon, que soutiennent à leur tour de fortes traverses. C'est ce dispositif, assez puissant pour permettre de soulever entièrement, mais d'une très-petite hauteur, la caisse des wagons-freins à quatre ou six roues, de manière à empêcher que celles-ci ne portent sur les rails (1); c'est, disons-nous, ce dispositif qui, appliqué en 1842 au plan incliné de Liège, dont nous avons déjà parlé, a si efficacement prévenu, en juin 1844, les effroyables accidents qu'aurait inévitablement entraînés la rupture de l'un de ces câbles servant à élever ou à retenir les wagons le long de ce même plan (2).

» Les droits de M. Laignel à cette utile invention sont généralement reconnus en Belgique, et l'administration du chemin de fer de Liège, à laquelle il avait présenté un modèle de frein en septembre 1838, lui a rendu, à cet égard, une pleine justice (3).

» Enfin, les autres services qui lui sont dus, sous le rapport de la sécurité des voyages en chemins de fer, ont paru à la Commission mériter à cet ho-

(1) C'est la vérité quand ces voitures, comme celles de marchandises, ne sont pas montées sur ressort; mais pour celles des voyageurs, la caisse seule est soulevée, et les roues avec leurs essieux faisant fléchir, par leur pesanteur, les ressorts, continuent de rouler sur les rails, mais sans supporter aucune autre charge.

(Note de M. Laignel.)

(2) Et précédemment les 22 et 30 septembre 1843, et encore le 5 avril dernier.

(Note de M. Laignel.)

(3) Il est employé en Angleterre, où il est appelé *frein de sûreté*.
1843. Les Annales des Ponts et Chaussées attestent qu'un seul de ces freins suffit pour arrêter complètement un convoi de quatre à six voitures de voyageurs ou de quatre en marchandises, sur un plan incliné de 0,03.

1844. Le Jury central de l'exposition s'exprime ainsi :

« C'est encore à l'infatigable persévérance de M. Laignel que l'on doit le système de freins très-puissants; l'expérience a montré l'efficacité et la puissance de ce genre de freins, lors

norable inventeur une récompense du premier ordre, qui doit être considérée comme une juste rémunération des sacrifices pécuniaires auxquels l'ont entraîné des essais et des expériences de tous genres, entrepris dans le but si louable de prévenir de trop fréquents et funestes accidents.

» La Commission, à l'unanimité, propose de décerner à M. Laignel un prix de *deux mille cinq cents francs*. »

d'une rupture du câble du plan incliné d'Ans à Liège, qui eut lieu le 22 juin 1844. L'action des freins arrêta le convoi sans que les voyageurs éprouvassent le moindre choc. »

1845. L'ingénieur des mines, M. Le Chatellier, dans son ouvrage sur les chemins de fer d'Allemagne (plan incliné d'Aix-la-Chapelle), apprend que les wagons-freins à traîneau ont été copiés sur ceux des plans inclinés d'Ans à Liège, où leur ingénieuse disposition a été empruntée à M. Laignel; et que sur les rampes dont l'inclinaison dépasse 10 millimètres par mètre, on peut faire usage des freins Laignel et se donner par là *toutes les sécurités désirables*.

1846. Lettre de M. Legrand, sous-secrétaire d'État au Ministère des Travaux publics, en date du 25 novembre dernier :

« Monsieur Laignel,

» J'ai reçu votre Lettre au sujet du frein dont vous êtes l'inventeur. Je suis très-empressé à reconnaître le mérite de votre invention, j'en ai étudié avec intérêt tous les détails, et j'ai toujours pensé qu'elle pouvait recevoir d'utiles applications.

» Signé, le sous-secrétaire d'État au Ministère des Travaux publics,

» LEGRAND. »

A ces améliorations je puis encore en ajouter plusieurs autres, d'un moindre intérêt à la vérité, mais dont la réunion forme un faisceau de moyens de sûreté et d'atténuation dans les arrêts, quelque violents qu'ils soient.

Toutes les modifications que je propose s'adaptent parfaitement au matériel actuel avec grande économie.

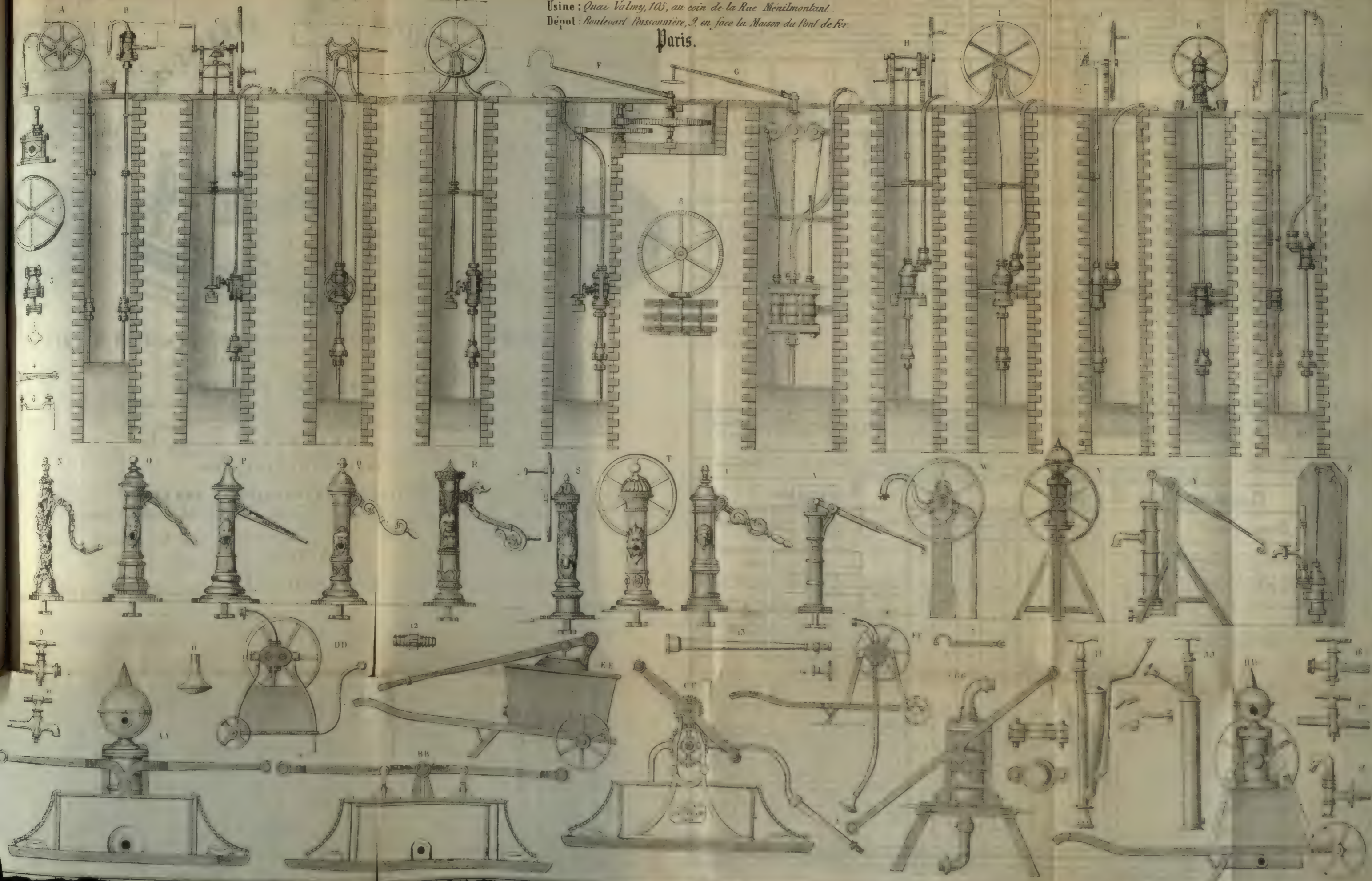
Remarque essentielle. — J'ai déjà plusieurs fois publié, avec raison, que l'emploi des traversines causait presque toujours de terribles catastrophes lors d'un déraillement.

De ce qui vient d'être exposé, il ressort d'une manière incontestable que, 1^o avec les courbes à petit rayon (système Laignel), on est maître de passer avec sécurité où l'on veut, d'éviter des viaducs dangereux construits comme celui de Barentin, etc.; 2^o avec les parachocs, d'atténuer beaucoup les chocs, etc.; 3^o avec l'amélioration des essieux, d'en obtenir une durée bien plus considérable, et d'éviter complètement les résultats fâcheux que cause leur rupture; 4^o enfin, avec le frein puissant et actif par pression verticale sans le secours des roues, d'arrêter à la distance de 50 à 60 mètres, au lieu de 5 à 600 mètres d'après le système actuel, et de descendre sans câble les plans inclinés de 3 centimètres.

Ces quatre principaux moyens, qui ne changent rien au matériel actuel, rendront les chemins de fer bien moins dispendieux et ramèneront la confiance qu'ont détruite les nombreuses catastrophes causées par les moyens vicieux des systèmes actuels. (Note de M. Laignel.)

DIVERS SYSTÈMES DE POMPES FABRIQUÉS DANS LES ATELIERS DE M^r LECLERC, INGÉNIEUR MÉCANICIEN.

Usine : Quai Valmy, 105, au coin de la Rue Ménilmontant.
Dépôt : Boulevard Poissonnière, 9, en face la Maison du Pont de Fer.
Paris.



By Her Majesty's Royal Letters Patent.
Lees' Patent Carriage Wheels, Axle-trees, &c. Sole Box:

This Patent Invention effectually prevents Accidents when the Axle-tree breaks, which is of frequent occurrence, and of frightful consequence with the Public Conveyances in London and elsewhere, as well as with Gentlemen's Carriages, and Railway Trains.

Lees' Patent is applicable to all kinds of Carriages & Machinery, for when the Axle-tree breaks, his Wheel will still retain its position, ~~run on, and carry on the Carriage with perfect safety to any length~~ of distance. It has been sufficiently tested and proved beyond all doubt, that his bearings are more than triple the strength and utility of the solid Axle. The draught of the Horse is greatly reduced and the bearing is proof against the beating or setting fast of the Wheel, and it carries a large supply of Oil to last more than twelve Months; it is also protected from the grit, &c, and the Wheels can be readily detached & replaced again. It very greatly obviates the sudden unpleasant jolt caused by the Wheels coming in contact with projecting substances.

A full sized pair of Lees Patent Wheels for Carriages, showing all the above details are placed in the Great Exhibition, Carriage Department, Western Division Class 5, 10517, where Gentlemen are invited to inspect them, and receive every explanation and where Licenses will be granted and orders promptly attended to by the Patentee or at 103 Long Acre. —

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ver, ou demandant une Pompe qui réunisse aux avantages de cette Pompe rotative, la facilité d'être réparée
sans de recourir à un ouvrier du métier, surtout pour les pays lointains ou les machines sont peu en usage
nouvelle Pompe; pour laquelle il vient de prendre un brevet de 15 années
à la fois deux pistons liés ensemble par une légère corde. D'autre que ces autres machines

By Her Majesty's Royal Letters Patent.
Lees' Patent Railway Breaks and Axle Box.

These Breaks act directly from the Axle and Box of the Wheels, with a Wedge power Shoe, which bears against the Wheels and Rails. The Shoe has a long surface, bearing on the Rail, of eighteen inches of Compound Adhesive Metal.

The inefficient Breaks commonly in use produce only five eighths, ($\frac{5}{8}$), or at most one Inch of bearing or friction from the Wheel on the Rail, which greatly destroys the Wheel Tyre & Rails, without a sufficient stopping power.

The stopping power or friction on the Rail of the Patent Break, has the advantage of eighteen to one (18 to 1) over other Breaks, by securing a certainty of taking the Rails in Wet, Foggy, Slippery Weather. This Break is free from the Frame of the Carriage and the unpleasant tilting motion, and that Mephitic Stench of the old Breaks.

Lees' patent Breaks are brought into action by one revolution of his powerful Screw and another half turn of the Screw throws the whole weight of the Carriage upon the Wedge Block bearing of the break against the Wheel & Rail thus freeing the Tyre of the Wheels from friction, and raising the Wheels clear of the Rails $\frac{1}{4}$ th part of an inch but no more; further rise being prevented, thereby the expensive wear & tear of the Wheels Tyre and Rails, which is of great consideration in the Current Cost of the Stock of Railway Companies. These Breaks can be brought into action on Inclines and in all cases where it is necessary to stop a train.

It put on under Carriage with Lees' Patent Breaks is placed in the Locomotive Department of the Great Exhibition, Western Division Part 5. No 307 where Railway Directors, Engineers and other scientific Gentlemen are invited to inspect the Breaks and where all information will be given respecting them.

Licensees granted or orders taken and promptly attended to by the Patentee or at No 103 Long, Lane



as son égale.

rev. on demandait une Pompe qui réunisse aux avantages de cette Pompe rotative, la facilité d'être réparée, de reconstruite à un ouvrier du métier, surtout pour les pays lointains où les machines sont peu en usage. La nouvelle Pompe, pour laquelle il vint de prendre un brevet de 15 années, à la fois deux pistons liés ensemble par une tige de fer, de sorte que les deux pistons



M. MERRYWEATHER,

LATE HADLEY, SIMPKIN, AND LOTT,
63, LONG ACRE, LONDON,

Patentee and Manufacturer of Improved FIRE ENGINES, with Metallic *Pistons* and *Valves* in detached Valve Chambers, so as to be proof against injury by violence or neglect: the valves are accessible, and may be got at in a few minutes, without disturbing the working parts of the engine. The construction of this ENGINE admits of its being worked with the dirtiest water for any length of time without injury, and retains its powers unimpaired in all climates.

The PATENT FIRE ENGINES are now extensively and exclusively employed in the several Government Departments, by the Nobility, Gentry, Merchants, Manufacturers, and corporate bodies in London, and many of the provincial towns throughout the kingdom, by the Railway Companies, the London Fire Engine Establishment, the Belfast, Liverpool, and Manchester Fire Police, and by the following Insurance Companies, who have them in constant use:—

ALLIANCE
ATLAS
BIRMINGHAM
BERKSHIRE
COUNTY
CHURCH OF ENGLAND

DISSENTERS
ESSEX AND SUFFOLK
ECONOMIC
GLOBE
GUARDIAN
HAND IN HAND

IMPERIAL
LICENSED VICTUALLERS
LONDON ASSURANCE
NORWICH UNION
NEWCASTLE
PHOENIX

ROYAL EXCHANGE
SUN
ST. PATRICK
SALOP
SCOTTISH UNION
SHEFFIELD

SHEFFIELD, ROTHERHAM,
AND CHESTERFIELD
UNION
WESTMINSTER
WEST OF ENGLAND
YORKSHIRE.

CABINET FIRE ENGINE.

Fig. 1.

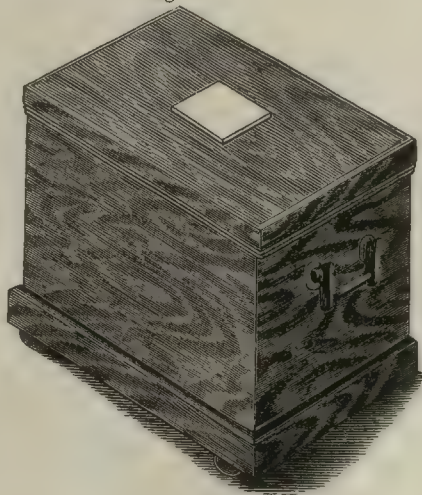
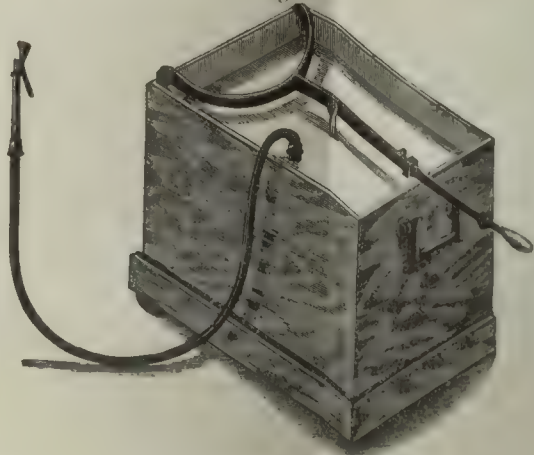


Fig. 2.



Fig. 3.



Portable, compact,
and capable of in-
stant application
by domestics, &c.

For the Protection
of the Upper Floors
of Galleries of
Museums, Hotels,
Club-houses, &c.

PORTABLE FIRE ENGINE.

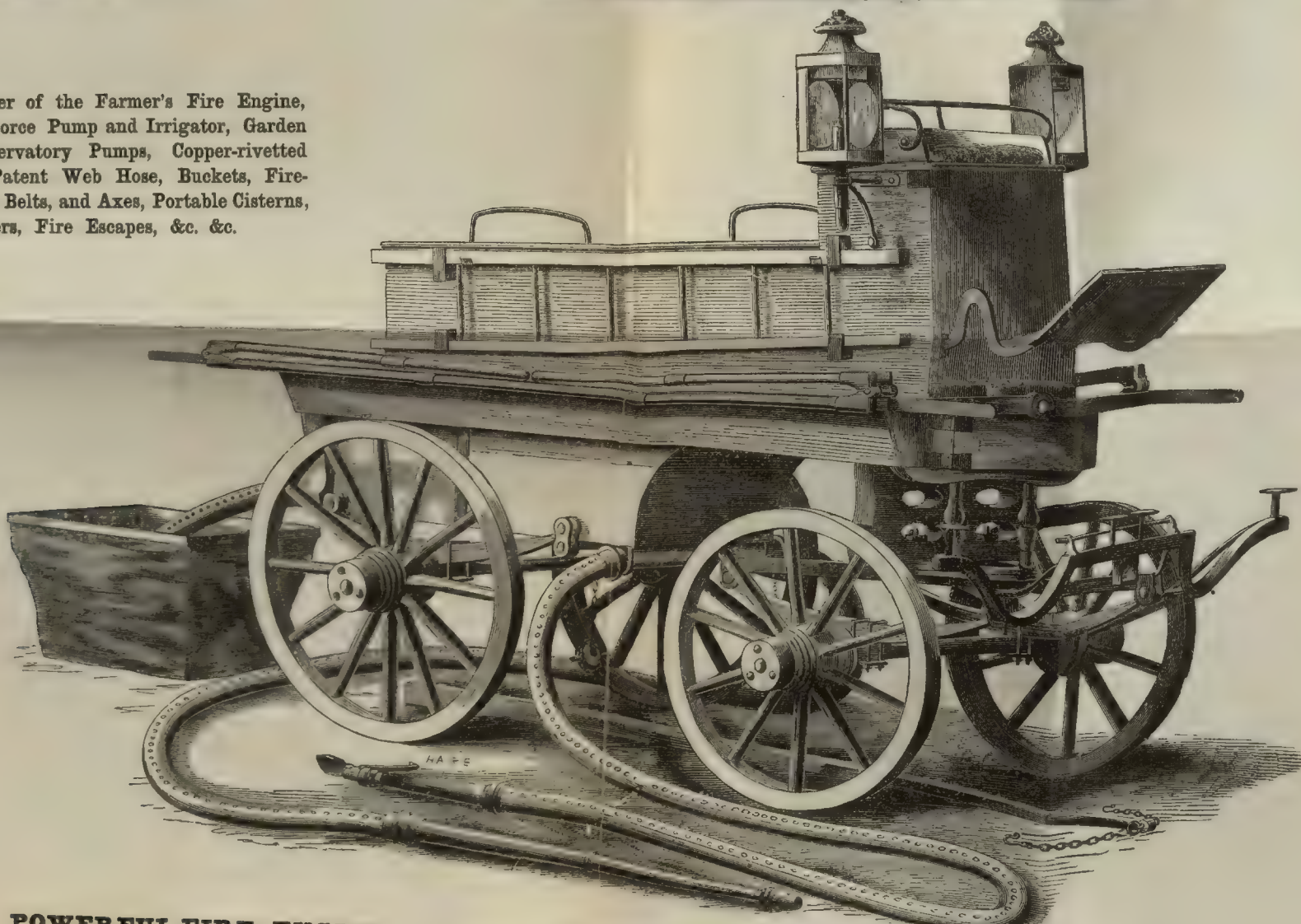


For Ships, Entrance Halls of Mansions,
Club-houses, Banking-houses, &c.



USEFUL FIRE ENGINE,
of various sizes, for Parishes,
Railways, Manufactories, &c.

Manufacturer of the Farmer's Fire Engine,
Horticultural Force Pump and Irrigator, Garden
Engines, Conservatory Pumps, Copper-rivetted
Leather and Patent Web Hose, Buckets, Fire-
men's Helmets, Belts, and Axes, Portable Cisterns,
Patent Spreaders, Fire Escapes, &c. &c.



POWERFUL FIRE ENGINE, for Insurance Companies, Fire-Police, Corporation, &c.

Fig. 2.

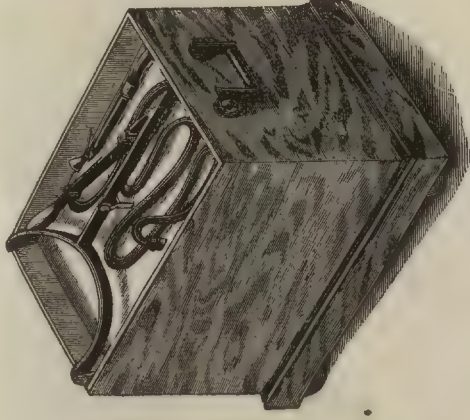
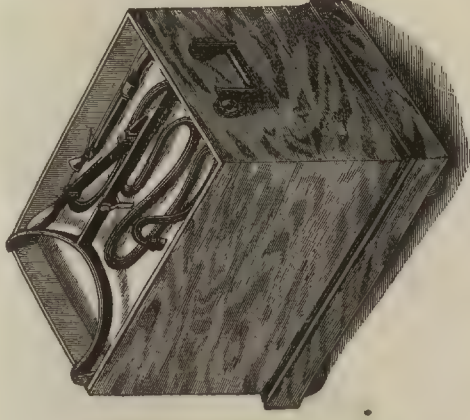
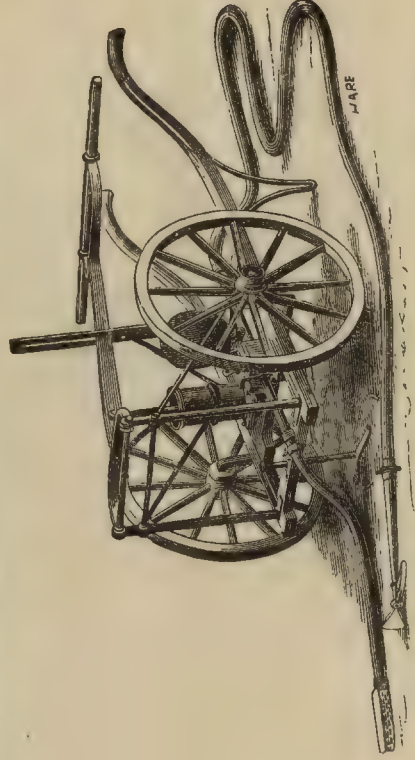


Fig. 2.



Engines	Engines	Engines	Engines	Engines
DUKE OF NORFOLK..... 3	MESSRS. GOSLINGS & Co.... 1	SIR W. W. WENN 1	EARL OF ARUNDEL AND SURREY..... 1	EARL OF ELLESMERE 1
LORD THURLOW 1	MESSRS. GLYN & Co..... 1	MR. PITT..... 1	EARL OF CHARENDON 1	LORD FALMOUTH 1
MARQUIS OF EXETER 3	GREAT BRITAIN STEAMER... 2	DUKE OF BUCCLEUCH .. 4	COUNTRESS OF BRIDGE- WATER..... 2	F. JOLLY, Esq. 1
LORD SAY AND SELE 1	DUKE OF LEINSTER 2	GREGORY GREGORY, Esq. 1	EARL OF HOME..... 1	MIVART'S HOTEL..... 1
MARQUIS OF AILESBURY.. 3	LORD WILLOUGHBY DE ERESBY 2	LORD BURGHLEY 1	EARL OF BRATBROOKE 1	JOHN ARKWRIGHT, Esq.... 2
GRANVILLE PENN, Esq. .. 2	LADY DUNMORE 1	COL. CARPENTER 1	SIR C. EARDLEY 1	
DUKE OF SOMERSET 1	DUKE OF SUTHERLAND 1	SIR A. MACDONALD 1		
CHARLES LEWIS, Esq 1	MARQUIS OF LANSDOWNE .. 2	J. S. FOLJAMBE, Esq.... 1		
TUN FIRE OFFICE..... 1	EMPEROR OF RUSSIA 2			

FARMER'S FIRE-ENGINE.



MANUFACTURED AND SOLD BY

M. MERRYWEATHER,

PATENT FIRE ENGINE MAKER,

No. 63, LONG ACRE, LONDON.

THE frequent occurrence of Fires in Agricultural Districts has led to the invention of a "FARMER'S FIRE ENGINE," combining in the smallest compass, and at the lowest cost, the several capabilities of a larger and more expensive fire-engine.

The above machine is so exceedingly portable as to be easily conveyed from place to place by one man, and is so simple in its construction that any person at a glance can understand and manage it. All the parts are so constructed and arranged as to be fitted for the roughest work of a farm without any fear of injury. The valves are of metal, and not liable to derangement; but should any obstruction occur, it can be removed instantly without disturbing any of the working parts of the engine.

The Branch-pipe is furnished with a *spreader*, by means of which the water can be spread over a large surface; a most invaluable appendage in the event of fire in corn or hay-stacks, weather-boarded buildings, and such like.

The suction and delivery hose are kept constantly affixed to the engine, so that the unbuckling of a single strap is all that is necessary for putting the engine into operation. Worked by three men, this engine will throw a jet of water from fifty to sixty feet high; and from the great rapidity with which it can be brought up and set to work, it will be found to be more efficient in arresting the progress of a fire than any more powerful agent applied at an advanced stage of the conflagration.

As an *agricultural force-pump* this machine will be found most convenient and efficient, adapted to all the ordinary operations of a farm, such as emptying ponds, clearing ditches, irrigating land, pumping liquid manure, &c. &c.

To country villages, and to gentlemen whose establishments do not require or warrant the maintenance of a more powerful fire-engine, the present offers much security and convenience, as well for extinguishing fire as for watering lawns and gardens, filling cisterns, &c.

M. MERRYWEATHER Manufactures Patent Fire Engines of all sizes, for Towns, Parishes, Insurance Offices, Railways, Mansions, Manufactories, and Shipping, upon the most approved principles; as also Garden Engines, Conservatory Pumps, and Syringes of all kinds; Copper Rivetted Leather, and Patent Web Hose; Buckets; Fire Escape Ladders; Firemen's Helmets, Belts, and Axes; Portable Cisterns; Improved Jet Spreaders, &c. upon the most reasonable Terms.

FIRE EXTINGUISHING MACHINERY OF ALL KINDS SUPPLIED OR REPAIRED AT THE MANUFACTORY, 63, LONG ACRE, LONDON.

PROSPECTUS.



Provisionally
24th April, 1851,

Registered
Act 14th Vic. c. 8.

MODEL OF A SELF-ACTING MACHINE OF A NEW DESIGN AND CAPABILITIES FOR WEIGHING AND DISCHARGING, INDICATING, COMPUTING, AND REGISTERING.

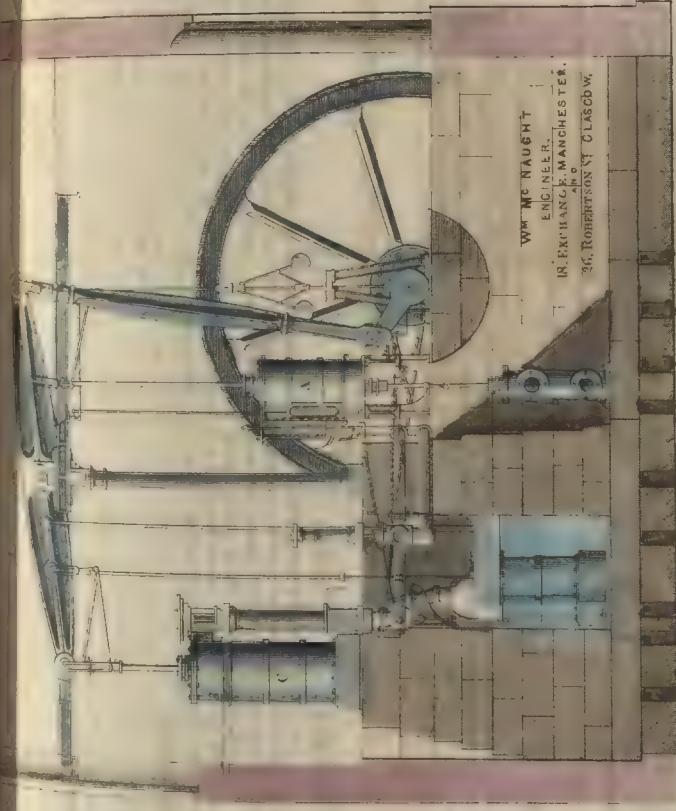
THE distinguishing features of this invention, based upon principles of economy and efficiency, consist in its simplicity and novelty of construction; combining with a superior mode of action the paramount advantages of economizing time and expense, checking fraud, and recording with unerring accuracy the aggregate of every day's transaction.

The importance and practical utility of this machine, from the accurate performance of its several offices, render it peculiarly applicable in various forms to commercial, trading, and domestic purposes, being alike adapted to the delivery and transhipment of cargoes, the discharge of coals and other minerals from mines, as also the requirements of the warehouse or counter. To private families and large establishments the use of this machine (whether fixed in the store-room or cellar) would prove invaluable from the fact of its keeping a faithful register of the minutest transaction, thereby opposing an effectual barrier to fraudulent practises. It is important to observe that from the simplicity of arrangement in the machinery, its action is rendered perfectly free and easy, consequently not liable to derangement.

To suit the requirements of any particular department, the machine may be graduated, both with regard to size, and British or foreign standards, to weigh from a quarter of an ounce to 10 tons or upwards,—registering quantities to an indefinite extent; whilst the immense saving, both commercially and otherwise, would soon compensate for the trifling difference in the cost of machines of an ordinary character.

For Address Cards, apply at the Stand, Class 5, No. 764, Great Exhibition; or by letter (prepaid) to Mr. W. MORRIS, Inventor, 2 Priory Place, Dover.

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MC. NAUGHT'S PATENT DOUBLE CYLINDER STEAM ENGINE.

PATENTEE—WM. MC. NAUGHT, Engineer, 26, Robertson Street, GLASGOW, and 18, Exchange, MANCHESTER.

JOINT PROPRIETORS { WM. MC. NAUGHT, Engineer, GLASGOW and MANCHESTER, and
J. & P. COATS, Thread Manufacturers, PAISLEY.

AGENT IN LONDON—W. K. WHYTEHEAD, Engineer, 69, Cornhill.

The object of this invention is the application of high-pressure steam working expansively to Engines which have been designed originally for low-pressure steam only, and offers the only safe method of effecting an increase of power combined with an important saving of fuel.

This Patent consists in the application of a high-pressure cylinder, A, at the opposite end of the working beam from the low-pressure cylinder, (usually at the crank end.) The steam is admitted at a high pressure into this cylinder, and after performing its duty there, passes through the pipe B into the cylinder C, where it expands, and from which it finally escapes into the condenser in the usual manner.

The slide valves of both cylinders are worked by the same eccentric. When a cold water pump is required, it is usually worked by the piston-rod extended through the high pressure cylinder, as shown in the drawing.

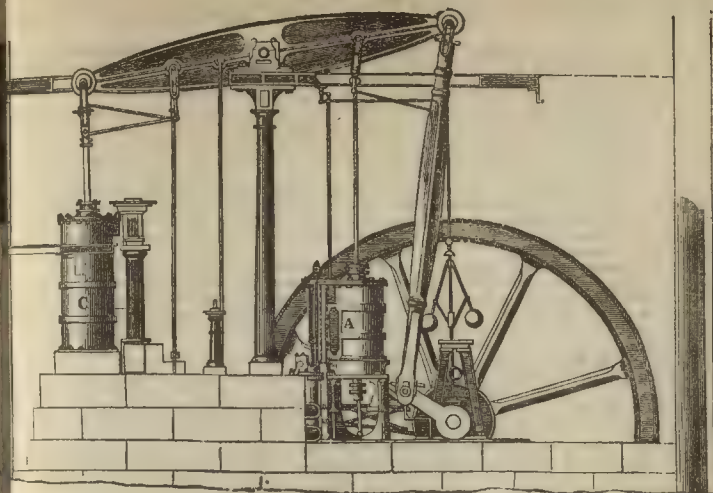
The relative positions of the high and low-pressure cylinders equalize the strain on the Main centre. The high and Crank walls, and thereby produce a much steadier and smoother motion, although the power of the Engine is increased.

The average saving of fuel in Engines to which this Patent has been applied, is from 30 to 40 per cent., and the increase of power has been to the same extent; but these have varied with circumstances. The pressure of steam required in the boilers is from 30 to 40 pounds on the square inch.

The cost of this alteration is trifling where the boilers are calculated for high pressure, or where they are worn out and require to be replaced; and the addition can be made whilst the engine is at work, a very short time being required to connect the pipes, &c.

This principle is peculiarly adapted for applying to existing Steam Engines, as also to the construction of new ones; and has already been applied to many Engines with most satisfactory results, as the following testimonials and references will prove.

Mc. NAUGHT'S PATENT EXPANSIVE ENGINE.



The object of this invention is the application of high pressure steam, working expansively, to Engines which have been constructed originally of sufficient strength only for low pressure steam. This is effected by adding to the engine a smaller cylinder, A, on the crank side of the beam, into which the steam is first admitted at high pressure, and from which it expands into the existing cylinder, C. The relative position of the two cylinders diminishes the strain on the centre of the beam and causes the engine to work smoother, although the power is increased. This Patent has been applied to a large number of Engines, with the best results, the saving of fuel varying from 30 to 40 per cent., and the power, in many cases, being increased in the same proportion.

Mr. W. K. WHYTEHEAD, C.E., 69, CORNHILL, LONDON, (Agent for the Patentee,) will examine Engines and Boilers, and other Machinery, and report on the improvement that could be effected in them, and will supply Drawings and Specifications for new work, repairs, &c.

The above Drawing represents the ordinary method of altering Land Engines. The Engine in the Exhibition (the Patent Marine Engine) is driving a SELF-ACTING BORIN-TURNING MACHINE, invented and patented by T. Coats, Esq., Thread Manufacturer, Paisley: attached to the Engine is one of Mc. NAUGHT'S STEAM ENGINE INDICATORS, by which the Engine is made to register the amount of work it is doing, and how it is doing it, by showing the actual pressure of the steam in the cylinder throughout the stroke.

More detailed particulars of these and other ingenious inventions will be found in the "ARTIZAN JOURNAL," a work conducted by and for practical men, who will find in its pages facts and unbiassed opinions on subjects in which they are interested.

Amongst the subjects treated of in the late Numbers, are:—

JANUARY, 1851.—Autobiography of an English Engineer who introduced into France the Light Iron Steamers, on the Loire, drawing 9 inches of water; Plan of the Gas Works, at Wakefield Prison; Details of Steam Stone-Sawing Machinery; Railway Accidents, and their Remedy; Analysis of the Results of the Experiments of the Commission appointed to enquire into the Application of Iron to Railway Structures, &c., &c.; with two large Plates of the Engines and Boilers of the Peterhoff, by Messrs. Rennie.

FEBRUARY.—On Turning Rollers, for Paper Machinery; Notes on the Great Grimsby Docks; Railways in Canada; Agricultural Engineering; The Patent Law Reform; Mechi's Agriculture; Invention in America; Armstrong's Experience on the Best Proportions of Steam Boilers; Mackintosh's Flexible Screw Propeller, &c.; with two Plates of Mine Hoisting Machinery in Wales, and Portable Pumping Engines, by M. Mazeline, the eminent French Engineer.

MARCH.—How are we to get Cotton from India? Experiments on the Strength of Iron; What rate of Expansion will pay the best, with a given price for Coals and Engine-work?—Premiums for the best answers; Drawing Schools for Artizans; Professor Moseley on the Rolling Motion of Ships—its application to Naval Architecture; Glynn on Constructing Cranes; the laws of Gravitation and the motion of a Pendulum, &c.; with two Plates showing the Effects of Crushing Forces on Cast Iron.

APRIL.—A Chat about Cornish Mines, and how the Author tried to Ventilate them; Potter's Type-distributing Machine; Parkinson's Water Meter; Carnell and Hosking's Treble-beat Valves; Fireproof Houses; New Method of Condensing High-pressure Steam; Ericsson's Caloric Engine; on Designing Coloured Goods, &c.; with two Plates of Details of the Great Central Gas Works.

MAY.—The Rotation of the Earth rendered visible and intelligible; The Cheap Gas Movement; Our Water Supply and Sewerage; Cocker's Revolving File; Iron Tubular Bridges; American Movable Locomotive Fire Box; Economy of High-pressure Steam; Theory of the Screw Propeller, &c.; with a large Plate of the Feathering Paddle Wheel of one of the fastest of the Thames Steamers.

JUNE.—Steam Engines in the Exhibition.—Nasmyth's and others criticized; New Gas Governor; Nasmyth's New Safety Valve; Official Report on Railways in India; Fairbairn, on Boiler Explosions, &c.; with an extra number of Illustrations, including a splendid double Copper-plate Engraving of Details of the Iron War Steamers, "Nix" and "Salomander," constructed by Messrs. Robinson and Russell for the Prussian Government, and armed on their New Patent Principle.

These Numbers may be obtained of any Bookseller, price 1s. each.

The following are the leading contents of the Numbers forming the Volume for 1840.

JANUARY.—Rules for Designing the Piston; McConnell on the Construction of Railway Axles; Low's Improvement in Sugar Manufacture; Highton on the Application of Electricity; Construction of a Trough; Self-feeding Stove; Arrangements for the Great Exhibition; Dimensions of New Steamers; The Screw versus the Paddle Wheel for the Brazil Mail Steamers; Evidence on the Reform of the Patent Laws, &c.; **PLATES.**—The Piston, quarter size; Steam Coal Whipping Machine, by Summers and Co.

FEBRUARY.—Tables for setting out Elliptic Arches; Improvements in Iron Manufacture; Starting Gear for Marine Engines; Miller's Patent Slip; Steam Farming; Details of Pen Drainage; Artizan's Home; Coffey's Patent Sizer; Reform of the Patent Laws; Ship Building on the Clyde, &c.; **PLATES.**—Cylinder, quarter size; Crampton's Patent Tank Locomotive, $\frac{1}{2}$ inch scale.

MARCH.—Schemes for Supply of Water to London; Ornamental Fountain in Paris; McConnell on Railway Axles; Improved Biscuit Making Machine; Construction of Railways over Bogs; Cast Iron Sleepers; Economy of Light Locomotives; Powers of Steam Jet; Steam Farming; New Stoves; New Patents; **PLATES.**—Plan of Cylinder; Air Pump, Bucket and Delivery Valve; Dudgeon's Expansion Slide Gear; Experiments on Railway Axles.

APRIL.—Key to Bourne's Catechism of the Steam Engine; How's Patent Salinometer; Sprague's Lubricator; Lord Willoughby's Steam Plough; Various Railway Springs and Buffers; Manufacture of Bank Notes; Britannia Bridge; New Patents; Victoria Docks; **PLATES.**—Self-acting Tide Signal at Sunderland Harbour; Tide Gauge at do.; Air Pump Bucket with Canvas Valves; Plummer Block and Connecting Rod.

MAY.—Rules for Hydraulic Engineering; Galloway's Water Tube Boilers at the Gutta Percha Works; High Pressure Feed Apparatus; Adams on Light Locomotives; Experience with do. on American Railways; Worm's Stereotype Printing Machine; Sanitary Improvement of Copenhagen; Price Locomotives for Austria; Lamb and White's Life Boat; Shepard's Sliding Gates; Hollow Bricks; Patent and Robinson's Steering Wheel; **PLATES.**—1, Trunk Engines of the Arrogant, by Messrs. Penn and 2, the Crank; 3, the Eccentric and rod.

JUNE.—Details of Trunk Engines; Hydraulic Engineering; Key to Bourne's Catechism; Double Powered Capstan; the Aberdeen Clipper Bow, Self-Acting Feed Apparatus; the Construction of Cranston Indian Railways; Railways Axles and Springs; Chapman's Patent Purchase Blocks; Siemens's generative Condenser and Evaporator; Boiler explosion in America; **PLATES.**—Section of H.M. Arrogant; Aberdeen Clipper Bow; Improved Capstan; American Water Tube Boiler; Boilers, the President and Cumberland.

JULY.—Details of Mr. Bourne's Plans for Indian River Steam Navigation; Indian Railways and Indian Cotton; Economy of Expansion in Atlantic Steam Navigation; New Brine Valve; Barran's Patent Railway Axle Boxes; Barlow's Permanent Way; Indicator Diagrams; Lowe's Effluvia Traps; Barrow more on Hydraulics; Halsted on Screw Propelling; Properties of Matter; Key to Bourne's Catechism; New System of Surface Condensation; Electro-Magnetism as a Motive Power; Boilers of the Expansion; **PLATES.**—Bourne's Steam Train for Shallow Rivers; Map of India showing the Cotton and Woollen Districts, and the extent of Country that might be opened up, upon Mr. Bourne's System; Barran's Railway Axle Boxes; the Feed Pump.

AUGUST.—Ships' Timber Sawing Machinery; Sickles' Expansion Gear; Proportions of American Machinery; Calculation of the Power of Water Wheels; Plans of Surface Condensation; Steam Plans for Adjusting the Compasses of Iron Vessels; Prolongation of Patent for Ericson's Steam Peacock's Anti-Sargassian Paint; Cape of Good Hope Mails; Improved Windlass; **PLATES.**—End view of Side Elevations of Hamilton's Patent Curvilinear Sawing and Beveling Machinery.

SEPTEMBER.—Expansion of Steam, with Indicator Diagrams; Slate's High Speed Blowing Engine; Campbell's Railway Points; Rodgers' Anchors; Ericson's Screw Propeller; Gillard's Gas from Water Explosive Bodies; Scoffern on Sugar Manufacture; Scott Russell on the Wave System; Use of do. from Blast Furnaces; Building for the Great Exhibition; Boiler Explosion at Bristol; Patent Reform; **PLATES.**—Petrie's Expansion Gear; Feed Pump Valve Box.

OCTOBER.—Steam Travelling Cranes; Timber Sawing Machinery; Agricultural Engineering; Lord Willoughby's Steam Plough; Atherton's Expansion Gear; Gray on Adjusting the Compasses of Iron Ships; Equilibrium Slide Valves; Calculation of Earth Works; Improving the Working of Steam Engines, with Indicator Diagrams; Cowper's Injection Valve; Boilers of the Ohio; Proportions of American Steamers; Effect of Shot on Iron Vessels; Building for the Great Exhibition; **PLATES.**—McNicoll and Vernon's Steam Travelling Cranes.

NOVEMBER.—Cheap Railways and Improved Railway Dividends; Steam Pump; Cost of Steam Power applied to Agriculture; Explosion on Board the *Queen*; Schemes for Aerial Navigation; Naught's Patent Double Cylinder Engine; Setting out Windmill Sails; Safety Boat Plugs; Reform of the Patent Laws; How to Put on Mud Hole Doors; Victoria Docks; **PLATES.**—Carrett's Steam Pump; Hamilton's Sawing Machinery.

DECEMBER.—Water Space Boilers; Experiments on Strength of Iron, by Railway Commission; Brunton's Coal Mine Ventilating Machine; French Method of Shifting Expansion Cams; Indicator Diagrams from a Double Cylinder Engine; Aerial Navigation; On Manufacture of Railway Axles; American versus English Tubular Boilers; Steam Fire Engine at the West India Docks; **PLATES.**—Lamb and Summers' Sheet water space Boilers, as applied to the *Tagus*, and for Ships of War.

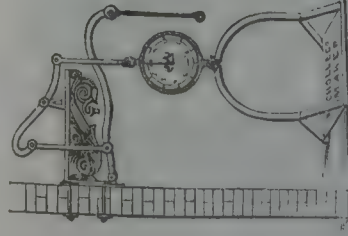
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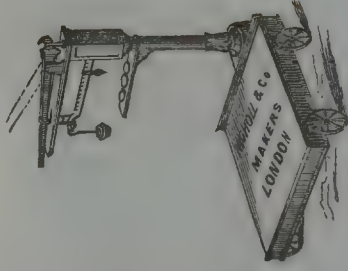
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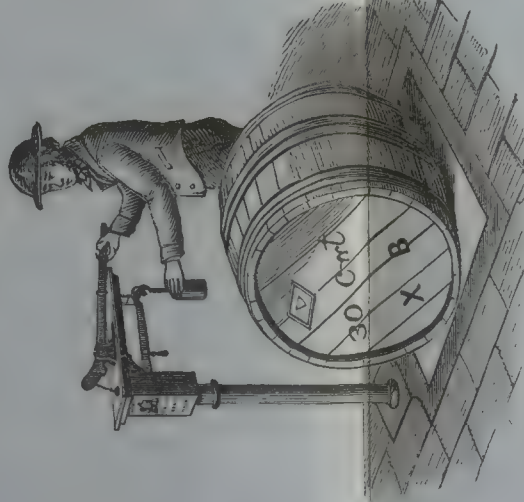
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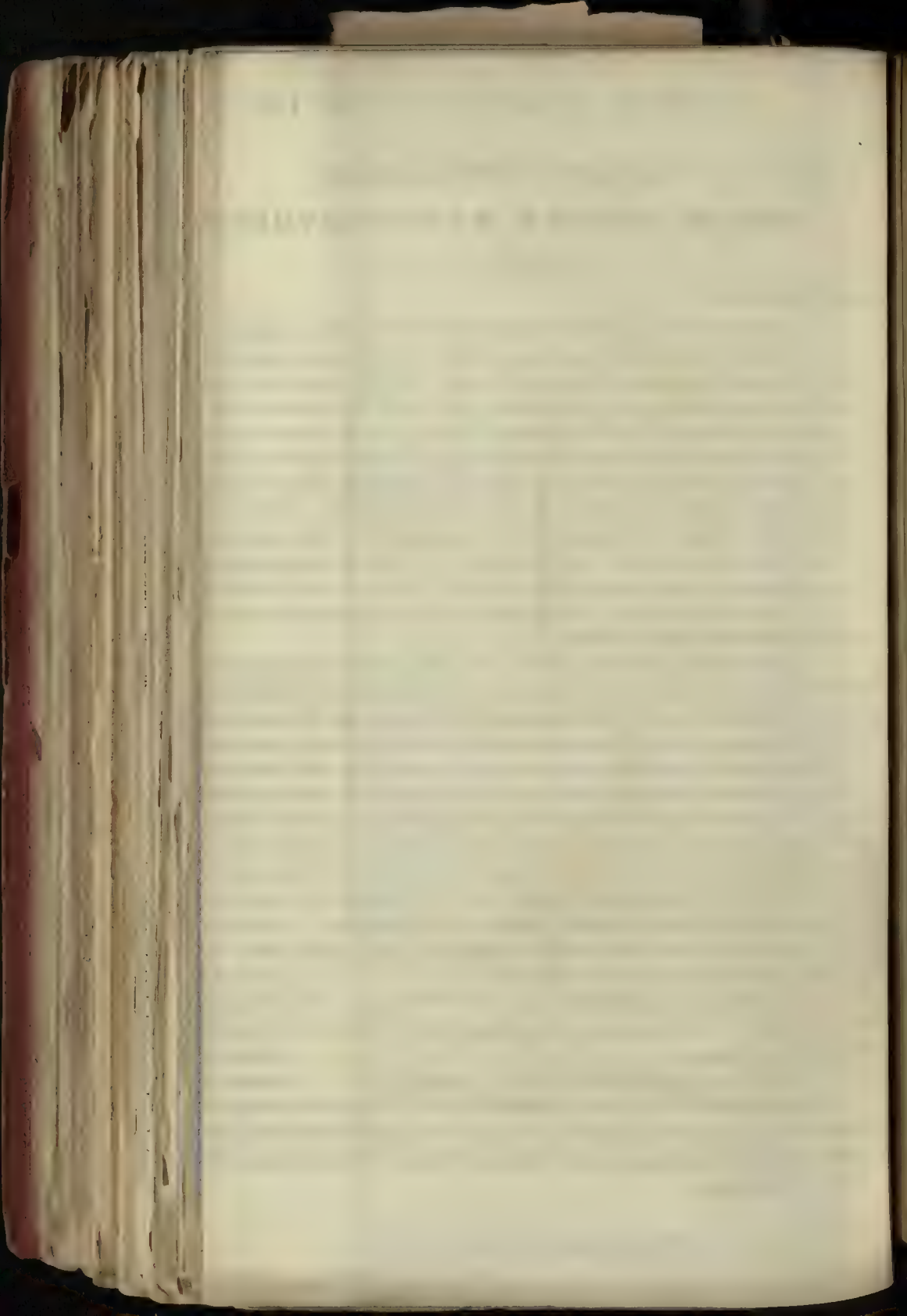
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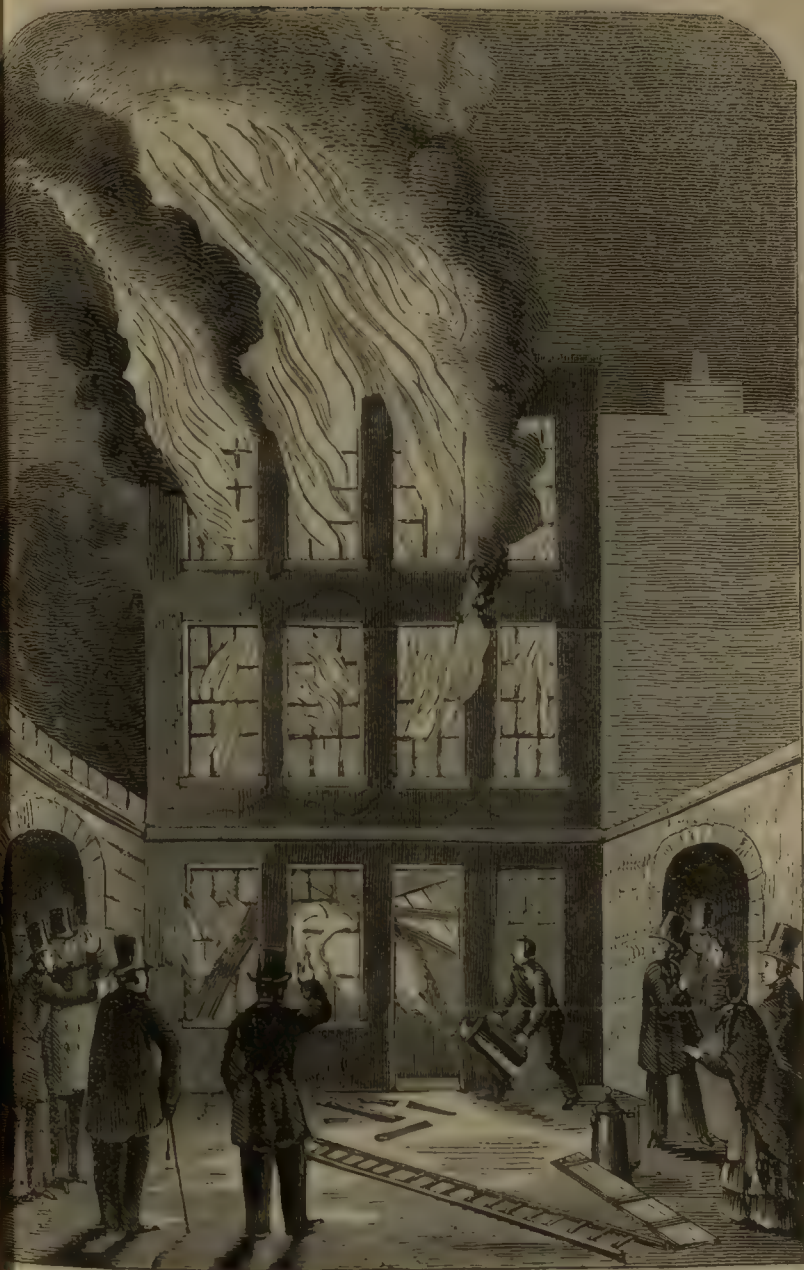
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As to its efficacy for Extinguishing Fire in Houses and Buildings.

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VIEW OF THE FIRE AT THE LONDON GAS-WORKS, VAUXHALL,
EXTINGUISHED BY PHILLIPS' PATENT FIRE ANNIHILATOR.

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THE HOUSE OF THE FATHERS
AND THE HOUSE OF THE MOTHERS

OPINIONS OF THE PRESS,

ETC.

AS TO THE EFFICACY OF PHILLIPS' PATENT FIRE ANNIHILATOR.

I. AS TO ITS EFFICACY FOR EXTINGUISHING FIRE IN HOUSES AND BUILDINGS.

Report of a Lecture delivered at the Royal Institution.

W. R. Hamilton, Esq., V.P., Treasurer, in the chair. Rev. J. Barlow On Mr. Phillips's Fire Annihilator." The annual destruction of property to the amount of more than two millions sterling, and the fearful loss of human life, necessitate additional resources against fire. The destructive agent of conflagration is flame. It is flame which occasions violent draught, produces the most intense heat, and most rapidly generates those suffocating vapours which render the burning apartment inaccessible. Mr. Barlow remarked that the origin and continuance of flame depended on two conditions; firstly, that the combustible material should be raised to, and kept at, a temperature high enough to afford a constant supply of inflammable gas; and, secondly, that it should be constantly fed with pure air. The usual remedy against fire is water. But water is able to interfere with the first of these conditions only. Unless the burning substance be so saturated with water that it cannot give out combustible gas within a very few minutes after it has been set on fire, the heat of the flame first extends, and then ignites other inflammable gases and vapours from various parts of the room; the flames are thus dispersed about the apartments; and by the time that the engine arrives, the contents of the house are frequently consumed. Mr. Phillips proposes to subdue flame by effectually disturbing the second condition of its continuance—access of pure air. The object of the Fire Annihilator is to diffuse through the atmosphere (already vitiated by the combustion) of an apartment on fire, a quantity of carbonic gas and steam, and thus render the continuance of flame impossible. These gases and vapours are generated in a portable apparatus, which, when intended for the protection of private dwellings, weighs from twenty to thirty pounds; and the construction is such, that the aeriform fluids can be evolved in less than three seconds, on touching a spring. When saw-mills or docks and large magazines are to be protected, Mr. Phillips recommends that larger machines should be stationed at convenient situations. The effects of Mr. Phillips' apparatus were exhibited in the lecture-room. A large volume of flame was made to issue from models of a house, a room, and a ship;

B

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INVALID CHAIR

and these flames were extinguished as soon as the Fire Annihilator was brought to bear upon them. Mr. Barlow remarked in conclusion, that while the common fire engine was necessarily tardy, required great power to work it, was liable to be rendered ineffectual by accidental circumstances, and occasioned inevitable damage to furniture, &c., the Fire Annihilator was always at hand, always ready for use, easily set in action, and that its coming into action when required might be as surely relied on as the discharge of a percussion gun when the trigger was pulled. That it occasioned no injury to furniture; and above all, that though it acted by producing fierce combustion, those who used it need apprehend no injury from it.—*Feb. 23.*

The Times.

PHILLIPS' PATENT FIRE ANNIHILATOR.—We have had an opportunity during the last few days, of witnessing some experiments of Mr. Phillips' Vapour Engine, by which flames are instantaneously extinguished. The discovery certainly appears most simple, and at the same time perfectly efficacious. The origin of this discovery deserves to be recorded as a proof of what may be accomplished by a man of genius and observation, who labours for the advancement of science in that best school of knowledge, the laboratory of nature. We are told that Mr. Phillips, the Inventor of this new Engine, was first led to prosecute his researches in this direction in consequence of observing that the vapour which issued from a volcano during an eruption had the effect of extinguishing flame the moment that it came in contact with it. He accordingly set about examining the composition of this vapour, and the present invention is the result of his inquiries. *February 1st, 1848.*

On Friday last a number of very interesting experiments were made at the London Gas Works, Vauxhall, with this ingenious and remarkable invention. This vapour extinguishes flame with a rapidity which is truly marvellous, and by it Mr. Phillips appears to have arrived at the simplest and most certain means of effecting a large saving in the immense annual loss of property and life by fire in this country; that loss is calculated to amount in property to £2,000,000.—*28th August, 1848.*

A discovery that will effect, if not the utter prevention of fires, at least their instantaneous or speedy suppression, will prove of great social benefit, and that the present invention will be of utility in this respect, in many cases, may be regarded as established beyond doubt.—*11th October, 1850.*

A public demonstration of this invention took place yesterday afternoon at the London Gas Works, near Vauxhall-bridge. The principal object was to show its efficacy in cases of fire in houses, though some other experiments were also shown, as we shall describe. In order to exhibit its action on a house on fire, a rough three-storied building was erected at the end of one of the company's retort-houses, made of boards, with open spaces for the windows and doors. The different floors were laid with joists, and the whole edifice nearly filled with planks and shavings covered with tar, turpentine, and other inflammable substances. The building is

which this was constructed was of brick, and roofed with iron, so that there was no danger of setting fire to any part of it. *The interior of the experimental house was then fired, and allowed to burn until the flames issued forth roaring like a furnace, and running for several yards along the iron roof of the external house.* One of the men then brought forward one of Mr. Phillips's patent machines, which have been often described before, and the effect of the gas on the flame was almost instantaneous. The flame immediately subsided, and by continuing to blow the vapour to permeate through the building the fire was wholly extinguished in a few minutes. *The almost magical way in which the large sheet of flame was subdued was very striking, and was loudly applauded by the numerous spectators.*

Before this experiment was shown Mr. Phillips gave a sort of explanatory lecture, illustrated on a smaller scale. He stated that the great advantages possessed by the gas employed by him over water were as follows:—The gas was evolved at a temperature of about 160 degrees Fahrenheit, and came in contact with flame having a temperature of about 1000 degrees, and under which temperature it could not exist. The gas absorbed part of this heat, and not only in proportion to its original volume, but expanded as much as a hundred times more, each part still retaining highly absorbent powers. Now, water thrown into a body of flame only acted on the part immediately in contact with it, and although it might be used at, say, 32 degrees Fahrenheit, much lower than the gas, yet it was found that a very small part assumed the form of vapour on coming in contact with flame, and spread through it, the greater quantity fell down by its superior weight and was wasted. Mr. Phillips then showed an experiment to prove this. He lighted coal gas in the hold of a model of a ship, and poured jug after jug of water on it without any effect, but immediately the vapour was brought in contact with it the flame was extinguished. He alluded to the late accident in St. Martin's Lane, and showed, by citing instances and experiments, how easily the loss of life might have been prevented by the use of his "patent." He did not deny the efficacy of water in conjunction with his machines, when it could be easily obtained, in fact it might be useful after the burst of flame had been checked and the atmosphere purified, to pour over the smouldering parts of a building; but there were cases in which it was of no use, when distilleries or gasworks were ignited, for then often the lighted spirit or tar floated on the water, and was conveyed to other parts of the building, to spread the destruction.

To show the advantages in such cases, of the fire annihilator, a large iron vessel, about six feet in diameter, and filled with coal-tar, was lighted in the yard. On bringing one of the machines to play on it, it was instantly put out, whereas, if it had been flooded with water, it would only have increased the danger, as it would have run a liquid flame to other parts of the premises. Mr. Phillips concluded by describing his "Fire Detector." It was intended to be used in stores and warehouses. It consisted of a wire of lead or gutta percha passing through the room, and at one end attached to a pendulum. A bell was to be placed near, so that the pendulum, if in motion, could strike it. Now, if a fire broke out, the wire would melt from the heat, the pendulum would be set at liberty, and in its successive vibrations would strike the bell and give the alarm. He also showed that his machine could be made self-acting. It

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INVALID CHAIRS

will be remembered that the gas is liberated by pressing on a small screw, which breaks the bottle containing the charge. By placing, therefore, the machine so that the pendulum, when set at liberty, should strike the screw, the vapour would be evolved and the fire extinguished or subdued at the same time that the alarm was given.—18th January, 1851.

A public demonstration of this patent took place yesterday afternoon at the London Gas Works, Vauxhall, the object of the demonstration being to illustrate the powers and efficacy of the fire annihilator machine, more especially with reference to the recent fires at the Houses of Parliament, at Messrs. Bousfields', Houndsditch, and at the New-cross Station. The programme was as follows:—An explanatory lecture was delivered by Mr. Phillips, illustrated by models. The great experiment of setting fire to a two-storied building, erected in the gasworks, filled with timber, shavings, &c., saturated with turpentine, and extinguishing it by the machine when at its height, was next shown, and the experiments concluded with igniting 80 gallons of tar and turpentine in a tank 18 feet in circumference, and placed in the open air, and almost instantaneously extinguishing the flame by means of the vapour. The experiments were precisely the same as those shown on a former occasion, and of which an account appeared in the columns of *The Times*; it will not, therefore, be necessary to give any detailed statement, but only to add that they all succeeded admirably. In fact, the experiment of the house on fire was more effective than last time, for, *although the flames were raging and pouring out at every crevice, it took less than a minute to extinguish them utterly by the use of the patent machine.* Mr. Phillips, in the course of his lecture, observed that some persons thought that the reason of the atmosphere becoming so immediately purified when his vapour was used to extinguish fire instead of water was that it contained some chemical properties by which a new atmosphere was created. This, however, was not the case. The vapour entered the building in a highly expansive state, extinguishing the flame by reducing it to a temperature lower than that at which it could exist, and expelled the carbonic gases or impure atmosphere. The room now, therefore, was full of the vapour; but, as the temperature decreased, the vapour returned to its original volume, and the air rushed in to fill the vacant space thus left. In fact, the action was the same as in a pump drawing water, or the condenser of a steam-engine. He divided a fire into two parts—the flame and the heated substances. Now, the flame was the most dangerous part, as it pervaded every part. Mr. Phillips proceeded to show, by pouring water on lighted coal-gas, that water would not extinguish it. The application of the vapour was immediately successful. He stated that, unless every part of a building was saturated with water, it would not act efficiently; and, though he granted that, if the whole were suddenly immersed, the effect would be instantaneous, yet the great difficulty lay in supplying water in sufficient quantity. To show this he instanced the late fire in the Houses of Parliament, where as many as seven engines were employed for hours; but in the experiment performed, where there was a greater body of fire, the instantaneous action of the vapour was perceived. *Mr. Lind, of the detective police, who witnessed the fire at the House of Lords, was sent by Mr. Mayor to view the experiments, and he stated to the secretary, in the hearing of our reporter, that if they had had the machine the fire*

could easily have been got under. Mr. Phillips continued at some length to explain the efficacy of the patent in cases of vessels at sea, warehouses containing oil or turpentine, distilleries, &c., and concluded by lamenting that some precautions such as these were not adopted with regard to the Crystal Palace for the Exhibition of 1851. He stated that the insurance companies considered it so dangerous, that they would not insure it except at a very large premium—as much as 15s. per cent. more than ordinary buildings. There was to be a main to supply water at a high pressure, passing all round the building, but he was convinced that water could never be sufficiently diffused to act effectively. When they considered a building which was to contain many millions' worth of products, and which would be lighted up, and, in addition to the silk, woolen, and other articles, they would be environed with thousands of yards of calico to subdue the glare from the roof, they would perceive the great danger which might be apprehended from fire. The only good safeguard would be to adopt the patent machines, and distribute them ready for use in every part of the building, so that if any part took fire it could be immediately extinguished.—7th February, 1851. [Since the above experiment, the Committee of the Great Exhibition of 1851, have determined to protect the Crystal Palace by the Fire Annihilator.]

Some experiments with these fire annihilators were performed on Friday afternoon at the London Gas Works, Vauxhall, before a numerous audience. Accounts have been so frequently given of former exhibitions of the patent, that it would be needless to say more than that they were of the usual kind, and succeeded admirably. *As on other occasions a highly constructed house was set on fire, and the flames instantaneously extinguished by vapour.* It was also shown that water had no effect on flame, by pouring it on carburetted hydrogen gas without any effect, whereas the vapour speedily put it out; and a large open vessel of coal tar being ignited, the same means immediately effected the desired result. Mr. Phillips, in his introductory lecture, stated that the amount of property destroyed annually was to the value of 2,000,000*l.*, the amount insured 1000,000,000*l.*, and the amount uninsured double this. It was to protect this immense capital that he brought forward this apparatus. A few days before, at one of his exhibitions, an alarm of fire in the neighbourhood had been given, and he was sent for to protect the burning premises, which was a distillery. The other buildings were entirely destroyed, although there were eighteen engines on the ground, and they had a command of 100,000 gallons of water, contained in a tank at the distillery. He cited this to shew the inefficiency of the water system. For a long time this agent had been recognized as the only effectual means of extinguishing fire, but it was now becoming a recognized fact that it was only useful in saturating incandescent embers, and was totally ineffective as a destroyer of flame, and as such he had shown by the experiments. His machines were being adopted not only in England, but in America, and on the continent, and he trusted the time would soon come when people, instead of allowing their property to be destroyed (which was now the case in nine instances out of ten of fire), would adopt the means which he offered for its preservation. Mr. Phillips received much applause from the spectators as each experiment succeeded.—March 17, 1851.

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 This Pump is free from Friction and Leakage
 This is the Pump.—Professor T. W. Arden.

The Morning Herald.

We were present, on Friday, at an exhibition or demonstration, of the practical uses of this invention, which has created much interest among scientific men. When it is known that upwards of £2,000,000 of property are annually consumed by fire, and that 1000 lives are annually sacrificed on shore, independent of the property and lives which are lost at sea from the same cause, any invention which has the effect of quenching a conflagration cannot fail to be of vast importance. The experiments on this occasion were made in a part of the premises of the London Gas Company, and the proceedings were commenced by Mr. Phillips with a short popular lecture on the character and attributes of fire, which element he showed could be brought under as much control as a stream of water. It was known that inflammable gas, vapour, and heat were the three essentials on which fire depended, and that without them fire could not exist. Water could not be depended upon to extinguish fire always; it was really only effective when we could place the burning matter under the surface of water, and thus exclude the air from it. The lecturer illustrated the case of a terrific eruption which took place some years since in the Mediterranean, when an island was thrown up from a depth of 80 fathoms. The flames reached a height of three miles, but as soon as the vapour arose, the flames were extinguished on all the points where it was seen, and, having witnessed this fact, his attention had been drawn to the subject more closely. The vapour with which he could extinguish a burning mass was so powerful, that, were St. Paul's Cathedral in flames in the interior, he could inflate it in two or three minutes if required. The vapour was perfectly innoxious, and tended to purify the air, and under its shield a man could approach close to any flames and extinguish the fire. It drew out all noxious gases, and in the case of foul drains, if there were a vent given, it would purify them immediately. In answer to a question put by a lady, Mr. Phillips said that the materials would last any time. The portable Fire-Annihilator is less in size than an upright coal-scuttle (sixteen inches in height by eight inches in diameter), and consists of a machine composed of four tin or thin iron cylindrical cases within one another, the central case containing a chemical preparation, in the form of a brick, composed of charcoal, nitre, and gypsum, which, whenever occasion requires, will discharge with the power of steam a vapour in which flame cannot exist. In the centre of this inner case is a small hole to receive a phial of the chemical compound which fires the inside substance and creates the vapour, on a pin being pressed down from the top and the lid screwed down. The first experiment was on a large jet of gas, upon which water was poured, which had no effect; but upon the lecturer applying a machine, not larger than a half-pint tumbler, charged with the vapour, the flame was extinguished in about three seconds. A small model of a house was crowded with combustible materials, saturated with turpentine, &c., the door was closed, and the flames rapidly ascended to the roof. Here Mr. Phillips showed that the gas given out by the flame of smoke was such as not to allow a person to breathe, and hence suffocation frequently followed when fires occurred. On applying a light to the windows, &c., where the smoke issued from, it was immediately put out. The same small machine, as we have before described, on the door being opened, was introduced, and the flames were extinguished as if by magic.

The whole of the interior was instantly purified, the light was applied to the roof, &c., and burned brilliantly. Then came an illustration of a ship on fire, which was very prettily given. The vapour was introduced downwards, the flames were subdued, and the vessel was instantly ventilated, and the smoke disappeared. To crown the success of the demonstrations others were given, which justly elicited rapturous applause, and could not fail to convince, beyond all doubt, the most sceptical, if it were possible any such persons were present. At the end of the building in which the experiments were made a building of wood was raised of the ordinary height, size, and appearance of a four-roomed house, and in the interior were placed planks covered and well *paid* with tar, turpentine, &c. On being set fire to, the flames ascended with wonderful rapidity and roared loudly, frightening some of the ladies present, who screamed most interestingly by way of accompaniment. While the flames were at their height "the Annihilator" of the larger size we have mentioned was brought to bear upon them, the party carrying it boldly going into the midst of the smoke. In five seconds the whole was extinguished; and in another second Mr. Phillips and the man who assisted him were seen on the top of the building—the one holding a light in his hand. Lastly, a circular vat of cistern, filled with tar and shavings, and then well served with turpentine, was set fire to. The vessel was six feet in diameter by one foot in depth. We leave our readers to imagine the volume and height of the flames from such a mass of combustibles. Nevertheless, in the midst of the heat and smoke, a person was seen who held in his hands "the Annihilator," armed with which he quietly walked round the cistern, and in a few seconds the flames were completely "annihilated." Several distinguished officers in the navy were named, who had declared that no ship of war or merchant ship ought to go to sea without these machines, and that no vessel ought ever to be burnt. The inventor does not disparage the present means of extinguishing fires; but he truly says that delay and uncertainty attach to such means. With one of these Annihilators charged we have no doubt that if the whole of a house were on fire the flames could be extinguished in a few seconds; but as applied to any outbreak in a chamber or a whole floor the effect would be instantaneous. These machines are made of various sizes. We never witnessed on any occasion experiments carried out with such eminent practical success. The importance of the invention is inconceivable; and we cannot doubt that an invention so well calculated to save life and property will be encouraged, and it deserves to be, by householders, shipowners, &c.—*March 18, 1850.*

To describe the success of these experiments would only be to repeat what which we have on former occasions attempted to do—namely, to declare the perfect success of each experiment.—*18th January, 1851.*

The Morning Chronicle.

The shavings having been ignited, the fire immediately communicated to the timber stores, and in a very few moments, the whole building—walls, flooring, and rafters—became the prey of the devouring element; the flames bursting furiously through the windows and the roof, and presenting the spectacle of an ordinary carpenter's shop on fire. To such a height had the conflagration attained, that many of the spectators, wavering in their

EXHIBITOR, W.W. CHAMBERLAIN, PRINCES STREET, TOMBLAND, NORWICH

This Pump is free from a patent. This is the Pump. —Professor Farthington.

INVALID CHAIRS

faiths, that it was capable of control, began to consult their own personal safety, by hastily removing to a distance: at this moment the workmen walked forward, bearing the wonder-working instrument; when, as if by the power of magic, and almost in the literal twinkling of an eye, the vast body of flame was quenched; and in the lapse of a few minutes every smouldering ember was extinguished. The success of the experiment was complete, and elicited the rapturous plaudits of the entire assemblage. Our readers may be aware that the machine by which these results were attained, is about the size and weight of a loaded coal-scuttle. . . . The vapour thus acting upon the flames, is of a respirable and innocuous character, and enables apartments that are on fire to be entered instantaneously. . . . Mr. Philips' invention eminently deserves the careful attention of the scientific, and if adequate investigation prove it capable of general adoption, its incalculable value in saving life and property, at sea as well as on land, is too obvious to require to be stated here. It is intended for universal introduction into factories and dwellings, when the machine, being always charged with the requisite chemical preparation, it would be always ready for instantaneous use in case of accidents.—18th January, 1851.

The Morning Post.

Unquestionably the most valuable instrument furnished by modern science and modern invention; no vessel, no public or private establishment, should be without it. It is certainly the cheapest and most desirable method of insuring both life and property. In our opinion, the whole metropolitan fire brigade establishment should be provided with the instrument, as, at much less cost to the companies, we might have the benefit of a treble security against the ravages of fire. We have more than once been present at the experimental Exhibitions at the London Gas Works, Vauxhall, when one of the most active proprietors entered into a clear and demonstrative explanation of its advantages. By a succession of experiments, each of which excelled the other in perfection, he clearly showed the pre-eminent advantage of the "Fire Annihilator," and of the anti-combustive gases, over water. Where flame, such as that of a large jet of burning gas, would be totally unaffected by any amount of water which might be poured upon it, it yielded in an instant to the effect of gaseous vapour from a very minute machine. The largest size of instrument used in extinguishing the great experimental fire was perfectly portable, and might be handled without any exertion of strength. The gaseous vapour emitted, although anti-combustive, is the contrary of the anti-respiratory. It renders the suffocating exhalation of fire tolerable, in the very midst of it, and is so refreshing as to enable the bearer of the machine to carry it into the midst of the fire. Upwards of 200 persons, amongst whom we noticed many of the most fashionable members of the aristocracy, have been present at these demonstrations, and after each successive experiment, grew more rapturous in their applause. Amongst other persons of distinction whom we last observed, were his Grace the Duke of Buccleugh, Vice Admiral Gordon, Colonel North, Mrs. Thompson and party, Mr. Berger and party, Mrs. Strachan and family, Mr. Creswick and party, Mrs. L. J. Adolphus and party, &c. The

experiments had previously been visited by his Royal Highness the Duke of Cambridge, Lord Brougham, Sir George Grey, the Marquis of Lansdowne, Lord Palmerston, Lord Byron, the Duke and Duchess of Sutherland, the Marquis of Aylesbury, the Marchioness of Exeter, Sir Edward Bocking, Admiral Bowles, Sir Charles Malcolm, &c. All have alike concurred in expressing their fullest approval of the results.—20th April, 1850.

The Morning Advertiser.

Yesterday, a numerous company of ladies and gentlemen assembled at the works of the London Gas Company, Vauxhall, for the purpose of witnessing a series of interesting and successful experiments, performed with the Fire Annihilator. As its name indicates, this machine has been constructed with the view to the almost instantaneously extinguishing of flame; our readers will doubtless remember that on a former occasion a detailed description of the construction and properties of the fire annihilator has appeared in the columns of this journal. Previous to the performance of the experiments yesterday, Mr. Phillips briefly addressed the visitors upon the subject of flame, remarking, that however efficacious large quantities of water might be in extinguishing incandescent heat, they were totally inadequate to put out flame, which, from its peculiar nature, travelled with the greatest rapidity, carrying with it destruction. It was necessary, therefore, that some application should be used which would impede the progress of flame, and ultimately extinguish it. With this object the fire annihilator had been invented. Mr. Phillips then proceeded to commence his experiments, the first of which consisted in almost immediately extinguishing a large body of ignited gas by means of a model annihilator. A representation of the hold of a ship, containing various combustible matters, was then fired, and when the flames had taken a firm hold, and the destruction of the burning mass seemed inevitable, an application of the patent speedily served to put them out. Other minor experiments were achieved with like success. The grand coup, however, was the firing of a large model, which had been erected on the works. This model represented a dwelling-house, standing some fifteen or twenty feet in height, and fashioned on the outside with windows, doors, &c., while the interior was filled with thin deal planks, shavings smeared with oil, pitch, tar, and other inflammable matter. On a signal given by Mr. Phillips, a man entered the building bearing a lighted torch, and proceeded to set fire to the structure in various parts; speedily the flames began to encircle the burning timbers, roaring and crackling fiercely and hotly. When the building seemed almost to be about to fall victim to the fire, which burnt fast and furiously, the annihilators were brought to bear upon the flames. The effect was almost instantaneous—a dense vapour for a few seconds appeared to surround the burning building, and when that disappeared, the former raging fire was extinguished even to a spark. The loudest plaudits followed this unequivocal manifestation of success. The company then adjourned to the spacious yard attached to the gas-works, where a large quantity of tar was ignited, and after having been allowed to burn for some minutes, was successfully extinguished by the fire annihilator.—March 8, 1851.

WM. SHALDEK, JUNIOR,
EXHIBITOR,
PRINCE & CO. PRINCES STREET, TOMBLAND, NORWICH.

INVALID CHAIRS

The Standard.

We never witnessed on any occasion, experiments carried out with so eminent practical success. The importance of the invention is incredible; and we cannot doubt that an invention so well calculated to save life and property will be encouraged, as it deserves to be, by householders, ship-owners, &c. &c.—*March 18, 1850.*

There is no production of modern science or modern discovery which is likely to become of so much general importance to domestic life and property as this. No series of experiments could possibly be more successful than those performed on Friday last (19th) in illustration of the instrument, already witnessed by H.R.H. the Duke of Cambridge, the Duke and Duchess of Sutherland, the Duke of Buccleugh, the Marquis of Aylesbury, the Marchioness of Exeter, Lord Palmerston, the Marquis of Lansdowne, Lord Brougham, Lord Byron, Admiral Sir E. Codrington, Admiral Bowles, Admiral Sir Charles Malcolm, Vice-Admiral Gordon, the Right Hon. Sir G. Grey, Sir John Rennie, and other distinguished members of the aristocracy, and eminent scientific men, who have all concurred in testifying at once their astonishment and their gratification. It was, indeed, surprising to see a volume of gaseous vapours (or apparent steam) issuing from a small cylinder, perfectly portable, and capable of being handled by any one, and instantaneously subduing an immense volume of flame composed of burning tar, pitch, naphtha, oil, grease, turpentine, fir-timber, &c. &c. It was still more astonishing to see what ease the firemen, protected by the vapour emitted from the cylinder, could deliberately and with impunity walk into the middle of a fire, whose heat caused distant spectators to recoil, and succeed in pouring the vapour into the interior of the building. This combination of gases is by no means injurious to animal life—quite the contrary, although it is indomitably anti-combustive. The flame of gas, or of such combustible substances or fluids as cannot be overcome (except by immersion) in means of water, are instantaneously extinguished by it.—*April 22, 1850.*

The Sun.

THE FIRE ANNIHILATOR.—Such is the title given to a wonderful machine invented by a gentleman named Phillips. A demonstration of the capabilities of the invention took place a few days ago, at the Gas Works, Vauxhall, and was attended with the utmost success. It is impossible, when we for a moment think of the numberless lives lost by fire, to overrate the value of this important invention; yet it is in form simple, and, what is better (for the million), cheap and portable: for instance, it may be placed in a closet, or in a hall, as a piece of furniture, and may be conveniently carried by a female being about the weight of a loaded coal-scuttle. Annihilators of large power, we are informed, will be easily portable by a man, and the machine for the protection of large establishments may be conveniently constructed by fitting up a convenient part of the premises (say five feet square), the vapour being conveyed, by means of flexible tubing, to such part of the building as may be on fire. A number of experiments took place, among

which we may mention that a model of an ordinary house was filled with pieces of wood immersed in turpentine, shavings, oil, pieces of tar barrel, and other materials of the most inflammable nature; fire was applied, and the flames rose with a perfectly roaring noise; the annihilator was applied, the vapour rushing from which with a hissing sound absolutely bore down the flames in less time than we have taken to describe the model building and the materials used.

In cases of fire happening in houses, or single rooms, the machine must be placed as near as circumstances will permit, and the tube or mouth of the hose inserted into the doorway, or into the window, and the lever or pump, by which the charge is ignited, being then struck, the vapour is discharged, and in a few seconds the fire, however fierce the flame, is entirely extinguished. One thing, and a most important thing it is, is that the vapour may be safely inhaled without any mischief, or the least ill effects, which the inventor proved to demonstration by placing the hose in his mouth, and imbibing what appeared to us a most unsavory draught.

The invention may also be applied successfully to fires occurring to a railway train, by merely carrying a moderately-sized machine in the luggage-van.

We must conclude, as we began, by stating it is a most wonderful invention.—19th July, 1849.

Another demonstration of the powers of this invention, on a somewhat larger scale than hitherto practised, took place yesterday in Battersea Fields. To show the value of the vapour, both on sea and land, a house and an old ship were the objects experimented upon. The house was a considerably substantial building, containing six rooms, each of which were fitted up with rough furniture, so that it might present all the appearances of an inhabited dwelling. In the hold of the ship a quantity of hogsheads, casks, sacks, and other things were stowed, to represent a general cargo. Visitors were admitted into the house and on board the vessel, and every facility was afforded to show them the inflammable nature of the contents. Fire was applied to the house a short time after eleven o'clock, when the flames soon issued from the windows and other apertures; after the fire had been allowed to rage for the space of five minutes, it seemed certain, under ordinary circumstances, that the house and its contents were doomed. Orders were then given to apply the vapour, which was done from two machines, one at the rear and the other at the front of the house. Almost immediately after the machines were brought to bear upon the burning mass, a sensible diminution of the fire took place, and room after room was acted upon with a like result. Twelve minutes after the inventor, Mr. Phillips, appeared upon the roof, and gave a signal that the house was saved; the vapour, however, still continued to be applied for some time longer, and it was not till twenty minutes from the time of the first injection that the fire in the body of the house was totally extinguished. A few pails of water were then applied to quench the smouldering embers, and, after the smoke cleared away, ingress was again had to the interior. A great part of the contents, and portions of the flooring and ceilings were found to be destroyed, and it was evident that the whole of the building must have been consumed had not this remedy been applied.—9th October, 1850.

It is recd. that Shalder's has copied nature and Leakage and is now...
 This Pump is true from Friction and Leakage in any position.
 This is the Pump.—Professor Hartington.

WM. SHALDEK, JUNIOR

EXHIBITOR, PRINCE'S STREET, TOMBLAND, NORWICH

INVALID CHAIRS

The Observer.

To the Editor of the Observer.

Sir,—The account published in the *Observer* of June the 10th, of the escape and Fire Annihilator, had excited very great interest, and the promised test of their merits in the presence of her Majesty's Secretary of State for the Home Department has been expected with some impatience. The exhibition took place on Tuesday morning, the 15th inst., at the London Gas Works, in the presence of Sir George Grey and Lady Grey, Lord and Lady Wharncliffe, Lord Dudley Coutts Stuart, who introduced the deputation to the Secretary of State, and in a simple but clear manner explained their objects, and the merits of the invention; John A. Smith, Esq. M.P., and his Lady; and at the moment of the most astonishing of all the performances, the Speaker of the House of Commons joined the spectators, and heartily participated in the general expression of wonder and satisfaction. The cutting off a flame seven feet in diameter, and five or six high, from a tank of blazing pitch at an instantaneous whisp of the steam from a ten pound charge of the Annihilator was quite like magic; but the extinction, in one minute, of the great fire of tar planks blazing twenty feet high, so intensely as to drive all but the gas men forty feet back, completed the amazement and exultation of all present. . . . If the results produced unbounded satisfaction and astonishment, the explanation of the nature and construction of the Annihilator gave almost equal delight; the immense power of three or four lbs. of charcoal, with two lbs. of nitre and two lbs. of plaster or gypsum, when converted from solid to a gaseous state, and combined with a quart of water, appeared to realize the extreme results of scientific calculations, whilst the cheapness of the charge, its preservability for years in perfect readiness, the facility of operating by a smart touch on a button, and the innoxious nature of the vapour, in which Lord Dudley Stuart and two or three other gentlemen immersed their faces without inconvenience, were considered the crowning practical merits of the invention; the only disappointment, especially among the ladies, was that these protectors are not ready for purchasers.

I am, Sir, respectfully,

20th August, 1848. *John A. Smith, Esq. M.P.* ONE OF THE ADMIRERS.

The Weekly Chronicle.

When this mass of inflammable materials was set on fire, the flames, as may be easily supposed, raged and roared with the utmost violence. Indeed, a conflagration of a magnitude and intensity was produced, such as few have before witnessed. The heat was so great, that the spectators were obliged to stand off at a considerable distance; and then was shown the really astonishing power of Mr. Phillips' invention.

A machine was put into action, of a size larger than the one already described (but still easily carried by a man, with one hand), and it was sooner did the vapour issue, than he was at once protected by it from the heat. He approached the fire within a few feet, and by directing the stream of vapour where requisite, the fire was extinguished as if by magic. We may safely say, that in less than two minutes a fire was extinguished which, with the mere ordinary means available, would have

tended to such a height as to defy the utmost efforts of water-engines subdue until any building in which it might have broken out had been completely destroyed. Nor is the utility of Mr. Phillips' machine confined to the bare extinction of the fire. The vapour which issues from it is also as a purifier of the atmosphere, which has been rendered by the destructive of life. This was shown by Mr. Phillips, in the next instant after the fire was put out, ascending a staircase, and standing on a platform (upon which, just before, a lighted candle was extinguished by smoke from the fire below) with a lighted torch in his hand. We cannot conclude this notice without expressing a hope that the patentee will meet with an ample reward for the genius he has exhibited in an invention so inestimably valuable to life and property. We expect, indeed, to see the time, when Mr. Phillips' machine will be regarded as necessary to the security of a house as a street door, whilst distillers and other manufacturers of combustible materials generally, will here possess a protection to their property and the lives of their workmen, not before within their reach. Again, when we contemplate the fearful disasters of a fire at sea, and call to mind the ill-fated Ocean Monarch, we maintain that no vessel should be allowed to sail without the protection of several of these powerful machines. Had not our notice already reached an inconvenient length, we might mention numerous other cases where Mr. Phillips' machine seems indispensable. We will only add that we know not how sufficiently to thank Mr Phillips, or to express our admiration of his invention.—26th August 1849.

The Shipping Gazette.

The powers of this extraordinary invention were tested yesterday at the London Gas Works, Vauxhall, in the presence of some hundreds of spectators, who were admitted within the company's premises by orders given by the Fire Annihilator Company. First a stream of coal gas was pumped on into the cabin of a small ship, and water being poured upon it, the effect whatever was produced. A small hand machine, less than a earthen pot, being directed to the burning apartment, instant "annihilation" succeeded, and it became evident that fire, though caused by the most inflammable of all elements—viz., hydro-oxygen—could not exist where a volume of this momentarily generated vapour should be introduced. A second and third demonstration succeeded, the one on a small case, and the other in the hold of a ship; both filled with the most inflammable wood, and well saturated with spirits of turpentine and resin. The effect of the introduction of the vapour was, in these as in the first experiment, instantaneous and complete, and the operator was greeted with unanimous and continued applause. Next came the larger and grand exhibition: a wooden house, of two stories, filled with light benches, covered with shavings soaked in coal tar and pitch, was set fire to, and so great was the heat, and so dense the atmosphere which rushed through every window, that the spectators were forced to retreat to a distance. At the fiercest moment two men entered the building, each carrying a machine, the size nearly of a nine-gallon cask, and in a minute and a half the vapour emitted from these two portable machines had nearly overcome the flames, and Mr. Phillips, ascending the staircase, showed from the first-floor windows, that the suffocating atmosphere

It is not a new machine, but a new principle. Shalder's is true from friction and Leakage and is not. This Pump is true from friction and Leakage and is not. This is the Pump. — Professor J. A. Shalder.

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INVALID CHAIRS

occasioned by the fire, had been driven out instantaneously by his vapour, the predominance of which did not affect him, nor would it any one else, even so far as to cause inconvenience in breathing. The last, the fire experiment, was the ignition, in the open air, of a large tank full of coal tar and turpentine, which, when fully in flames, was also immediately quenched by the momentary application of the vapour from one machine. Monsieur Fur, agent for the government of Austria; Captain Simon and members of the Canterbury Association; scientific members of Lincoln's-inn and Somerset-house, were among the spectators, as also was Inspector Lund, of the Detective Police, who bore his testimony, that if he had had one of these machines on the occasion of the fire at the House of Lords, he would have accomplished in a few moments what took several fire-engines to effect in many hours. A remedy against calamity so effective, and we may also add, so economical, ought to be universally patronised.—*7th February, 1851.*

The Mining Journal.

This ingenious and really valuable invention possesses an overwhelming power in extinguishing fire, and is constructed on a principle for superseding the use of water by the generation of vapours, non-supporters of combustion, which instantaneously prevent the spread of the devastating element, and with this advantage, that the furniture and linen not destroyed by fire are totally uninjured by the gas evolved.

The concluding, as well as the most conclusive, experiment was made on a house large enough for a family to reside in, consisting of two rooms, one above the other, built of timber, with the usual door and window openings, inside the walls of which were arranged loose planks and timber, covered with masses of shavings, saturated with tar and spirits of turpentine. On this being ignited, a true representation of a burning house was given; the fire was allowed to gain an ascendancy which water could have overpowered, and which made the audience assembled retire to a respectful distance. The annihilator was then brought into requisition, and instantly the devouring element succumbed to its more powerful opponent. In less than one minute the atmosphere of the interior was converted into a white vapour, in which, with a lighted torch in his hand, Mr. Phillips immediately appeared at the first floor window, showing that he was in a perfectly healthy atmosphere, when he received the congratulations and applause of the spectators. However short-lived the above exhibition may appear, it is quite clear to us that the process is based on sound philosophical principles, and that it will, ere long, be taken up by the fire insurance offices. When we consider its extreme economy in first cost and application, its certainty and instantaneous action, and the vast amount of life and property which would be saved by its general use, we think it will at a future time, be considered one of the most valuable inventions of the day; and we trust the Inventor, and the Company which has been formed for carrying out the principle commercially, will reap those advantages which is due to all who introduce to the world great public benefits.—*September 29, 1849.*

In the *Mining Journal* of the 29th September, we gave an account of some interesting experiments which were conducted by Mr. Phillips, the

patentee of the new fire annihilator, at the establishment of the London Gas Company, Vauxhall, affording convincing proof that, while water is useless when a fire in a building has obtained a hold, except in saturating surrounding materials, and thus preventing its spread, the vapours generated by this apparatus are perfect non-supporters of combustion, and that no fire can exist for one minute after the atmosphere surrounding it has been charged by their application. The alarming fire in London-wall, on Saturday night last, and the approach of winter, when calamities of this kind are of more frequent occurrence, has again called our attention to the subject; and, convinced as we are of the soundness of the principle, and the perfect success which must attend its use, we shall be most happy if our remarks tend, in the smallest degree, to promote its general adoption. As regards the large and destructive fire above alluded to, had one of the largest hand annihilators been in requisition in the neighbourhood at the first outbreak, the destructive element would have been subdued in the first instance, and the large amount of property supposed to be destroyed, saved; while even when the building was in one mass of flame, and the firemen been supplied with some of the annihilators of the more powerful sizes, the fire would have been got under in from five to ten minutes, instead of requiring the exertions of a number of men for thirty or forty hours in deluging the remains of the property with water, and thus utterly spoiling what probably had escaped burning. It is a remarkable and one of the most advantageous features of the invention next to its annihilating powers, that as it instantaneously extinguishes fire, so immediately does it create a perfectly wholesome atmosphere for inhalation, and the most delicate fabrics which might escape the flames are uninjured by the vapours generated. We would, therefore, suggest to the board of directors of insurance companies managing the fire brigade department, to Mr. Braidwood, the superintendent, and to country insurance companies, whether it would not be advisable to give the new extinguishing apparatus a fair trial. We know how prone human nature is to hang to old associations, and how difficult it is to introduce new modes of action to the exclusion of the old; but in this age of improvement and scientific advancement, the public look to public men to carry out new discoveries, which promise to be productive of general benefit; and in this instance nothing could be more easy, or devoid of any inconvenience, and, at the same time, without involving an expence worth naming, when the prospective benefit is considered, than for the firemen, when called out with their engines, to be provided with some of the large hand annihilators, and thus give them a fair trial. Should they not prove of the advantage represented, the operators would be provided with the element usually employed—water; but should they turn out to be generally effective, as we expect they will, it must, on consideration, be perceived what a vast amount of annual loss would be prevented to the companies and to the public; while the safety to human life would, doubtless, form a large item connected with their introduction. During Mr. Phillips' lectures, in which we have adverted, he described to the audience the natural phenomena which first suggested to his mind the idea of applying vapours to the extinguishing of fire in buildings. It appears that, many years since, he was on board an English man-of-war, cruising in the Mediterranean, when one of those extraordinary phenomena occurred, which few have had an opportunity of witnessing—the formation of an island from the

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Shalders has copied from the
This Pump is free from Friction and Leakage and
This is the Pump.—Professor Farthington.

INVALID CHAIR

depths of the ocean by volcanic agency. After the consolidation of the water, where the sea was eighty fathoms deep, to an extent of sixty miles in diameter, the volcanic action continued with extraordinary impetus, notwithstanding an enormous chasm was open on one side of the island, into which the waters flowed in foaming torrents, and were constantly ejected, in combination with red-hot cinders and flames of lava to a perpendicular height of probably three miles. At this awful moment the vessel, about two miles distant, was gradually drifting, at a slow but certain rate, with the current, directly into this vast fiery opening, and consternation and despair of all on board may be better fancied than described. All was given up for lost, when suddenly the eruption ceased, a vast body of vapour escaped from the crater, and a current of wind springing up from the island, bore the apparently doomed vessel away in safety. From this perilous adventure, Mr. Phillips was struck with the idea which formed the basis of his present invention. He considered that water, *per se*, had evidently no extinguishing effect on the flame, or even on the source whence it arose; but as soon as a sufficient quantity of vapour had formed in the fiery depths to cut off all connection with the atmosphere, and thus prevent access of oxygen to support combustion, instantly the flames were checked, the very foundation of the fire annihilated, and the island alone remained to show the extraordinary outbreak to which Nature had been subjected. Having thus embodied the idea, the next difficulty was the construction of an apparatus which should instantaneously be available, and which should be certain in operation, and this has been most completely effected. The charge in the machine is a chemical compound of a combustible nature, but only when fired by chemical means. It then gives out a most intense heat, sufficient instantly to vapourise the water contained in the case, and which, mixing with its own vapours, forms the gaseous compound, in which no fire can exist. Although thus a strictly chemical operation, it is so arranged that the most unenlightened, or even a mere child, can perform the action required with ease and safety, it being merely pressing down a peg in the top of the outer case. This peg breaks a capsule containing sulphuric acid, which, dropping into a tube containing chlorate of potash and lump sugar, mixed in the form of a powder, the charge above noticed is instantly put in a state of combustion, and the effects mentioned are the result. We understand that the public generally are becoming alive to the safety of having one of the annihilators in their houses, as offering such simple yet certain means of stopping the ravages of fire when an embryo; and no theatre, bank, or other public establishment, gentlemen's country mansions, where, from their isolated position, fires are generally so fatal, nor ships at sea, should be without one or more of these life and property saving machines.—*October 13, 1849.*

The Wesleyan Times.

We cannot help noticing this most important and invaluable of inventions. Nothing can be more perfect or more conducive to private comfort and security, as the safeguard of public edifices, lives, and property, than this convenient, portable, and simple little instrument. It is merely a small cylinder, perfectly capable of being handled without any effort or strength, and charged with ingredients which, upon percussive combu-

produced by pressing the hand sharply upon the vertex, rapidly generates and emits a volume of *gaseous vapour*. This *gaseous vapour* is no longer introduced into the apartment or building where fire is raging, and the flame is instantaneously subdued. Although anti-combustive, the compound of gases in question has the great advantage of being *respirable*, and even restorative, against the suffocating effects of exhalations from fire. Thus poured into the base of a building it would save the hapless victims who might chance to be above and in the worst of the smoke, not only from the danger of fire, but from the chance of being smothered. In a whole house or range of houses, a whole family or many families, may be saved from inevitable destruction, without any personal risk, and with very little trouble or exertion. The experiments, which were attended by our reporter, have been honoured by the presence of H.R.H. the Duke of Cambridge, the Duke and Duchess of Sutherland, the Duke of Buccleugh, the Marquis of Lansdowne, the Marquis of Aylesbury, the Marchioness of Exeter, Lord Palmerston, Sir George Grey, Lord Brougham, Lord Byron, Admiral Sir Edward Codrington, Admiral Bowles, Admiral Sir Charles Colclough, Vice-Admiral Gordon, Colonel North, Sir John Rennie (with many eminent engineers and men of science), and many other distinguished members of the aristocracy. Witnessed by the keenest and most critical judges, none have been able to find the slightest fault in the operation, and all alike have concurred in expressing at once their astonishment and ratification.—22nd June, 1850.

The Historic Times.

The fire was now at its height, and the building appeared to be doomed to destruction; but two men, shielded by the vapour emitted from the portable machine, which each of them carried, approached the burning house, when the fire was suddenly annihilated, and Mr. Phillips, carrying a lighted torch, and followed by several strangers, ascended the staircase and appeared at the upper windows; thus proving to the delight and satisfaction of the numerous visitors that his assertions as to the powers of his invention, both in regard to extinguishing fires and purifying an atmosphere charged with smoke, were fully borne out in practice.—April 9th, 1850.

Household Words.

No. 12.—Page 280.

Without further words a lighted match is applied to one of the tarred and turpentine shavings that hang in the ground-floor of the house. It sparkles, blazes, and in one moment the lower room is full of flames—in the next, they have risen to the floor above: they crackle, roar, and beat about, springing up to the roof, and darting out tongues and forks to the right and left of the building, while a dense, hot cloud of smoke, full of red fragments of shavings and other embers, comes floating and dancing over the heads of the assembled company. Everybody has risen from his seat,—Ladies, Gentlemen,—and now all the visitors are crowding towards the other end of the building: the whole place is filled with the roar of flames, the noise of voices, hurrying feet, and rustling garments, and clouds of hot smoke! But suddenly a man enters the building from

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WM. SHALDEK, JUNIOR,
EXHIBITOR,
PRINCE'S STREET, TOMBLAND, NORWICH

INVALID CHAIRS

a side-door, bearing a portable Fire Annihilator of the size we have mentioned: he is followed by a second; the machines are vomiting forth a dense white vapour,—they enter just within the doorway of the blazing house. A change instantly takes place in the colour and action of the flames, as though they grew pale in presence of their master,—they sink there is nothing but darkness, and the dense white vapour coiling about in triumph. “Life can now exist,” cries Mr. Phillips, rushing into the house and ascending the blackened stairs *May 11th, 1850.*

The Gardener's Chronicle.

By the sudden ignition of a mixture of charcoal, gypsum, and nitre in a vessel containing water, a prodigious volume of carbonic acid, nitrogen, and aqueous vapour is instantaneously extricated, and when directed upon a fire, as instantaneously extinguishes it, or, as Mr. Phillips says without exaggeration, annihilates it.

The apparatus by means of which this great result is obtained is not bulky, nor costly, nor liable to get out of order, nor tedious in its application, nor dangerous to keep, nor difficult to apply; it is the reverse of all these. With an apparatus which might, without the slightest inconvenience, be kept in a lady's bed-room, not bigger, in fact, than a music-box, we have ourselves seen a fire of timber-shavings, tar, and combustibles, blazing so fiercely that it could not be approached within 20 feet without inconvenience, extinguished in a few seconds by a lad. Such a fire would not have been put out by a common fire-engine in a quarter of an hour, even if the machine, the men, and the water were all at hand when it broke out.

Persons in cities may be indifferent to fire, because they have the great insurance companies incessantly on guard; yet even they are not free from the most fearful risks. A curtain catches fire, wood-work follows; the firemen are sent for, they arrive, the flames are extinguished (perhaps) but the room at least is gutted, and the house is left a wreck, with windows smashed, and the furniture and fittings ruined by the inundation that is employed. An “annihilator” in a dwelling-house would render all this impossible; for, in its employment, nothing is perceptible except its marvellous efficiency, brought about by a cloud of pure vapour, scentless, and incapable of soiling a muslin window curtain.

If it is attended with these advantages even in a city, how much is its value enhanced when we consider the unprotected, and unprotected condition of all sorts of country property? Mansions and cottages, stables, barns, ricks, and timber-yards, can scarcely be said to enjoy any protection from fire. If burnt they may be paid for by the insurance companies; but there is no means of preventing their destruction when fired. No engines can be had; or no water to be found in sufficient quantity.

Every day brings examples of this. We find the following, for instance, in this morning's daily paper:—On Tuesday morning, about 10 o'clock, a fire was discovered in a stack-yard, containing about 12 ricks of corn, in a village six miles from Nottingham. The Nottingham fire-engines were sent for without delay, but by 2 o'clock eight stacks of wheat were consumed. The fire had by this time reached a barn filled with corn, which, with various carts and implements, were speedily consumed. The dwell-

house was only saved by the great exertions of villagers and firemen ; corner of it was burnt. *The fire continued to rage until the evening.* Had an annihilator been at hand the fire would have been extinguished while a man was mounting a horse, in order to search for a fire-engine.—September 22nd, 1849.

On Tuesday morning, a further experimental trial of the invention of Mr. Phillips for extinguishing fires took place on a spot of ground close to the river, in Battersea-fields, between the Nine Elms Pier and the water-works. A crowd of spectators attended to witness the experiment, among whom were a number of the fire-brigade, and many scientific persons. A six-roomed brick house, containing rough furniture, deal boards, &c., was set on fire ; a body of flame was created in every room at the same time, and the flames soon issued from the windows and other apertures ; after the fire had been allowed to rage for the space of five minutes, it seemed certain, under ordinary circumstances, that the house and its contents were doomed. Orders were then given to apply the vapour, which was done from two machines, one at the rear and the other at the front of the house. Almost immediately after the machines were brought to bear upon the burning mass, a sensible diminution of the fire took place, and room after room was acted upon with like result. Twelve minutes after, Mr. Phillips appeared upon the roof, and made a signal that the house was saved ; the vapour, however, still continued to be applied for some time longer, and it was not till twenty minutes from the time of the first injection, that the fire in the body of the house was totally extinguished. A few pails of water were then applied to quench the smouldering embers, and, after the smoke cleared away, ingress was again had to the interior. A great part of the contents, with portions of the flooring and ceilings were found to be destroyed, and it was evident that the whole of the building must have been consumed, had not the remedy been applied. At the close of this demonstration, Mr. Phillips addressed the assemblage, expiating on the benefits of the invention, and congratulating them on the success of the experiment. The value of the annihilator was however more especially shown in the second experiment. In this case, the hold of a small vessel was filled with turpentine and salt-petre casks, hogsheads, &c., containing shavings. These were set on fire, and when the flames issued forth, the power of the annihilator was tried. Here the fire was confined in a small space, and the steam consequently acted upon it with full effect. The result was quickly seen, for in less than five minutes the flames were overpowered sufficiently to enable a person to go below, and nothing was visible but the vapour discharged by the engine. At present, as Mr. Phillips observed in his address to the spectators, it was to be viewed as an imperfect development of a new invention ; yet even now it is obviously capable of being employed to vast advantage, and if kept in manufactories, and used at the commencement of a fire, it may be instrumental in saving life and property with far more certainty than by the use of water, since the steam so purifies the air, as to enable men to pass through the flames for the purpose of rescuing individuals thus perilously situated.—October 12, 1850.

It is now has copied name and address of the exhibitor.
Shallers has been from Friction and Leakage and
This Pump is free from Friction and Leakage.
This is the Pump.—Professor J. A. R. Friction.

WM. SHALDERS,

EXHIBITOR,

BRIDGE STREET, TOMBLAND, NORWICH

INVALID CHAIRS

The Patent Journal.

How entirely he (Mr. Phillips) has succeeded, it is superfluous for now to explain: the numerous experiments which have taken place, on a very large scale, show what a thoroughly applicable and efficient apparatus he has produced. Without going into details, we may state, that it consists of a very portable machine, composed of thin sheet-metal, containing a block composed of charcoal, nitre, and gypsum, and a certain quantity of water: a small bottle, containing sulphuric acid, is placed in the centre of the block, and so arranged, that a blow on a small projecting piece of metal at the top of the apparatus, will break the bottle, and causing the acid to act upon the block, produce instantaneously a rush of vapour, consisting of the vapour of water, nitrogen, and carbonic acid. The effect produced is almost magical: in the experiment which we witnessed on Friday last at the London Gas Works, a building, composed of wood, on which quantities of tar and other inflammable matters had been placed, and which was full of shavings in the same state, was set fire to, and produced a terrific volume of flame. Two machines being applied, in less than a minute every vestige of flame had disappeared, and Mr. Phillips immediately ascended to the upper story, to show that the effects of the gases evolved were not injurious to life. The complete success of all the experiments we were spectators of on Friday, renders more thorough our conviction, that no dwelling-place, or building of any description, in which any risk of fire is run, should be without one of them. And we are perfectly convinced, also, that were they in that extended use that they deserve to be, such a thing as destruction of property from fire, far less loss of life, would never be heard of. We have heard it advanced against this machine, that it is not calculated to cool large incandescent masses, such as we invariably find in a conflagration after the volatile matter has been driven off; also that in large, open, and isolated spaces, when the wind is strong, the vapour and gases emanating from the machine would be blown away too quick to produce any effect. Now, in the first place, it is perfectly certain that by the proper use of the machine, no such incandescent masses would ever be allowed to form; and in the second place, that even although there might be cases in which the wind would be too strong in exposed, open, and isolated places, to allow of a perfect action of the machine, yet would such cases be most rare, and would involve no risk of life; for it is quite evident, that, in the case of a building or vessel, of whatever description it may be, the draught caused by the combustion in the interior will always most materially assist the action of the machine, by rapidly drawing in the mass of vapours and gases it evolves; thus aiding them to spread over every portion of the flame's extent.—22d March 1851.

Extract of Report to the Vestry of St. Pancras.

Lord Dudley Stuart, M.P., in the Chair.

Phillips's patented Fire Annihilator: at our first enquiries, objections apparently well-founded, and also unfounded prejudices, besides the delay in carrying out the patent, obscured and clouded its merits. We have

helped to clear away obscurity and doubt, and to establish for it a high character, as a cheap and ready mode of generating steam in quantity sufficient to stifle large masses of flame without danger to human life.

The extraordinary development of gases from a solid or liquid being thus premised, we have to describe the experiments on a large scale. A boiler or tank of liquid pitch, seven feet in diameter, was set fire to, giving a flame equal to a hundred large links. An annihilator containing a charge of 10lbs. of combustible and three pints of water, at one sweep skimmed off the whole flame in a moment, with a tenth part of its steam, the remainder being used to subdue another intense fire. A pile of debris of tar-barrels had been raised 18 or 20 feet high; it was ignited, and copiously sprinkled with spirits of turpentine; its heat drove the spectators back a distance of 30 feet, emitting violent flames and volumes of black smoke. An annihilator of 10lbs. charge, and the remaining steam of the former, extinguished this great fire in one minute. But what gave the greatest satisfaction was, the perfect security to life, and, it might also be said, the absolute absence of any inconvenience with which Lord Dudley Stuart immersed his face, and stood in the steam of the annihilator, which instantly reduces the flame to an innocent temperature without perceptibly affecting the breathing of the human lungs. The expressions of admiration and astonishment were general; Sir George Grey, the Speaker, and every one present, declared their unqualified satisfaction; and so did the Marquis of Lansdowne, and Lord Palmerston, on a previous occasion.

Such are the means of safety from fire tested by your deputation, and they consider the result as most satisfactory. Five pounds worth of annihilators on board the Ocean Monarch, would have saved more than a hundred lives cast headlong into eternity, would have prevented accumulated misery on a still greater number of human beings, and have preserved property to the amount of, probably, £60,000.—29th August, 1848.

Extract of Letter from Lord Viscount Gage.

Firle, Sunday, 6th January, 1850.

I am happy to be able to report to you a very successful experiment yesterday, though not upon a very large scale. Some old cottages were pulled down, and I had a room left, the walls of which were hung round with dry furze to represent drapery, and several small parcels over the floor, this burned so fiercely that in merely putting in the machine, the flames coming out of the door singed my hair, nothing could have been more hopelessly on fire; it was, however, all out in about a minute, and we could have gone in, but for the pungency of the wood smoke which stopped us for a few minutes. The room was of course but small, 750 feet, so that the large* machine I used was ample power. A crowd assembled were highly delighted.

(Signed) GAGE.

* A No. 3 Machine.

WM. SHALDEKES, JUNR.
EXHIBITOR,
PRINCE'S STREET, TOMBLAND, NORWICH.

It is free from ...
Shalders has copied nature and ...
This Pump is free from Friction and Leakage and is not ...
This is the Pump.—Professor I Arthington.

INVALID CHAIRS

AS TO THE EFFICACY OF THE FIRE ANNIHILATOR FOR EXTINGUISHING FIRE IN VESSELS.

The Times.

An interesting experiment was tried yesterday with Phillips' patent Fire Annihilator, at Poplar, near Messrs. Somes' Yard. The object was to test the usefulness of this apparatus in extinguishing fires in ships for this purpose a vessel, the *Wear*, about 150 tons burden, was prepared lying high and dry on the shore. The main hold was partly filled with old hogsheds, barrels, and bags, smeared over with tar and turpentine, and filled with shavings, dry wood, and other combustible materials. About half-past twelve o'clock, on a signal from Mr. Phillips, the patentee, who conducted the experiment, the hatches were closed, and this inflammable cargo fired. A dense smoke was soon to be seen oozing from every crevice, affording a very sufficient proof that the fire was increasing under the deck. In about five minutes the hatches were opened, and, to the disappointment of some, a thick column of smoke ascended, but as yet no flame. Those better acquainted with the theory of flame, knew that the presence of atmospheric air was necessary to produce that phenomenon. It soon came, however, and a much greater blaze than one would like to witness at sea, rose from the lower deck. Now came the time to put it out. On a signal from Mr. Phillips, the machines were brought forward, looking something like large iron watering-pots, and the gaseous contents liberally poured down upon the flames. The effects were soon visible. The fire was gradually reduced, and in less than ten minutes extinguished. A man went down almost immediately, and passed through the hold, showing that the atmosphere was pure and uninjured. Although the wood of the barrels, &c., was charred, and showed the action of the fire, yet hardly anything was actually consumed. The apparatus is very simple in its construction; each machine is made of sheet-iron, of a cylindrical form, and about two feet in diameter, and three feet in height. They have an inside casing, perforated with holes at the sides, but only part of the way down. The mixture, made of simple chemical compounds, is placed inside, and a small bottle, containing another mixture, with it. A small quantity of water is contained at the bottom of the machine, between the two casings, and, as the gas is formed by the union of the two mixtures, rises through the perforated holes, and mixes with them. The water is only introduced to increase the expansive force of vapour. The machine being closed, a screw is turned, which, pressing on the bottle, breaks it; the compounds mix, and the gas issues out through a tube with considerable force. Each machine will give 1,200 cubic feet of gas. Six of them were used for this day's experiment. It will be remembered that, some time ago, a fire in a mine was extinguished by the introduction of carbonic acid gas, thus saving the enormous expense consequent on using water, which has to be pumped all out again. The spectators remained on the deck of the vessel.

ring the whole of the experiment, and experienced no inconvenience in the gas used. It certainly was surprising to see in how short a time the lower deck was clear. In a few minutes there was none of that dense, suffocating smoke which every one must have experienced who has witnessed the extinction of a fire by water.—24th December, 1850.

Yesterday a public demonstration took place near the Thames Police station, Poplar, of the powers of this invention in extinguishing fires in ships. The hull of an old vessel, 150 tons burden, was filled with sugar casks, tar and turpentine barrels, saltpetre bags, and other highly combustible materials. This inflammable mass having been ignited, the hatches were kept closed for a short time, and on the removal of them the whole blazed up with extraordinary violence. When the flames had acquired a high degree of intensity, the Annihilator was brought into action, and in an incredibly short space, not more than a few seconds, the blaze had been almost entirely subdued. A minute or two after, and the fire was completely put out—annihilated by the vapour which was poured from Mr. Phillips' ingenious machine. To describe the way in which the invention acts is unnecessary, as the details have already been several times published in the *Times*. We then expressed an opinion that the annihilator would be found most valuable in cases of Ship fires, where, as is generally happened, they broke out in the hold. The display of yesterday fully establishes the accuracy of this view, and the large number of spectators present, testified their astonishment at the rapidity with which the great body of flame was extinguished, by a loud cheer.—Jan. 8th, 1851.

The Morning Herald.

The powers of the patent fire annihilator were again tested yesterday, in the presence of a great number of persons. The same vessel with which the former experiments were made at Battersea-reach having been brought down the river and moored in the neighbourhood of the Thames Police station at Poplar. Its main hold was filled to the hatches with some twenty sugar barrels, a dozen turpentine and tar barrels, and a large number of saltpetre barrels, together with an immense body of carpenter's shavings. Fire having been applied to these highly combustible materials, it was allowed to smoulder and extend itself, with the hatchway down, for about ten minutes, when the hatches being removed, and the atmosphere allowed to enter, the flames shot forth to the height of 20 or 30 feet above the deck, and there was every appearance that an extensive fire raged below. Two or three of the portable machines were then brought to bear upon the flames, and their effect in subduing them was almost instantaneous, and the fire was completely extinguished in five minutes. We have before had occasion to notice experiments with the annihilator on board the same vessel, and have pronounced our opinion that when so used it will prove most efficient. The present experiment tends only to confirm that opinion, and we do not hesitate to avow our belief, the result of repeated observation, that as a precaution against the fearful consequences of a fire at sea, every ship should be supplied by its

WM. SHALDEK, EXHIBITOR,
PRINCE'S STREET, TOMBLAND, NORWICH

It is now has copied name and Leakage and
Shallers is fire from Friction and
This Pump is fire from Friction and
This is the Pump.—Professor 1 artington.

INVALID CHAIRS

owners with one or more of these useful and comparatively inexpensive machines.—*24th December, 1850.*

A public demonstration of the efficacy of this invention in extinguishing fires on board ships was made yesterday on board the *Wear*, a vessel of 150 tons burden, moored off the Folly-house, near the Folly-wall. The vessel was filled with the following materials, in order to test the power of the agent employed:—One dozen sugar-hogsheads saturated with sugar; one dozen turpentine barrels saturated with rosin and turpentine; one dozen tar barrels, and twenty sulphur bags, these being filled, with shavings and other combustibles. The hold of the vessel being thus filled, the signal was given, and the whole mass of combustibles was set light to from the bottom of the fore part of the hold, and it was allowed to burn with the hatches closed for several minutes. Mr. Phillips then showed that in the absence of the admission of a great body of air, such a burning mass might continue for several hours on board a ship, and yet scarcely be perceived. He then supposed the case of a ship on fire under such circumstances; he called to the supposed crew to clew up their sails, and in order to ascertain the extent of the fire, (a mode usually practised,) he had the hatchway opened—the rush of air on an instant caused the flames to ascend with immense power, so much so, that many of those who were in the fore part of the vessel, thought it prudent to make good their retreat by the ladder which was placed amidships. The “conflagration” was permitted to rage for several minutes; after which, on the word being given by Mr. Phillips, his men brought the portable machines forward. Each of these portable machines is of about 20 horse power, that is to say that from the peculiarity of the invention the vapour, from the nozzle or spout of each, was emitted at that ratio. Two of these were brought in succession on the burning mass from the mouth of the hatchway, and in three seconds the vapour had extinguished the great body of the flame, leaving one or two small points where flame was discernible; and in about two minutes the vessel was almost clear of all smoke. The inventor observed that of course in such an emergency the crew of a ship would be employed in extinguishing the smouldering fragments by supplies of water. The marvellously sudden disappearance of the flames elicited loud cheers from the gentlemen on board, and from those on shore, who were within 20 yards of the vessel.—*8th January, 1851.*

The Morning Chronicle.

Yesterday Mr. Phillips gave one of a series of public “demonstrations” of the power of his fire-annihilator to extinguish fires in ships. The first exhibition took place at two o’clock, the second at four, and both were well attended. The *Wear*, of 150 tons, was the vessel experimented upon. Besides the crowds of spectators collected upon the Blackwall Railway pier, a great number of persons assembled on board to witness the working and effects of Mr. Phillip’s apparatus. This may be considered no small proof of confidence in his invention, when it is remembered that the orders by which visitors were admitted stated that the “main-hold of the vessel was filled with sugar hogsheads, tar and turpentine barrels, saltpetre bags, and other highly combustible matter.” Mr. Phillips as usual commenced with a prefatory explanation of his discovery, and of its

peculiar properties and use. He upheld the superiority of the humid vapour emitted with force from his annihilator, capable of easy direction to the burning material, penetrating the interstices of the cargo, and particularly efficient in extinguishing flame over water, which, as a compact body, had not the same power of combining and grappling with flame, but only acted upon the fuel, as it were, of the fire, leaving the flame to propagate itself in all directions, and seize whatever combustibles might come within its reach. He then proceeded practically to prove that in the case of a ship in flames, where it would be impossible to apply water to the part of the hold in which the fire might be, he could, by the emission with prodigious force of the humid vapour which he recommends, effectually save the vessel and crew. The apparatus, to judge from its operation on this occasion, is at once simple and efficacious. The machines were placed in the hands of common sailors, who having placed them as near as possible to the hold, whence flames were shooting upwards, struck the pin by which the charge was ignited, and thus discharged the vapour, which, according to promise, speedily extinguished the fire. Presence of mind is all that would seem to be required to work an engine, which, properly applied, must always be successful. We congratulate Mr. Phillips on his invention—"a machine, containing a chemical preparation, which, whenever occasion demands, will discharge with the power of steam a vapour in which flame cannot exist."—*January 29th, 1851.*

The Morning Post.

A very successful demonstration of the power of this machine took place yesterday, on board a hulk moored between Greenwich and Blackwall. The hold of the vessel (150 tons) had been previously laden with sugar hogsheads, turpentine barrels, tar barrels, saltpetre bags, and other combustible materials, and when the parties invited to witness the experiment had assembled, the cargo was fired from the lower part of the hold. The fire was allowed to burn for twelve minutes, at the expiration of which time the flames had made their way through the deck. The hatchway was then withdrawn, and the flames instantly shot up to the height of twelve or fourteen feet above the deck of the ship. Mr. Phillips at this moment directed his men to apply two of the machines charged with the vapour, and no sooner had they been brought into action, than the whole of the flame was instantaneously subdued. The fire continued to smoulder for some minutes, but before a third machine was exhausted, not a spark was to be seen. The experiment was witnessed by a great many persons from the shore, all of whom manifested, by their plaudits, their surprise and gratification at the extraordinary result exhibited. Of the usefulness of the machine on board all ships, it is impossible to speak too highly; but fortunately for the inventor, he has obtained the patronage of the Queen, in whose royal palace of Windsor one of four machines always in use extinguished a dangerous fire in a flue fifty feet high, only last week. The construction of the machine, and the agency by which its powers are produced, have been too recently described in the *Morning Post* to render any repetition necessary. Suffice it to say, that when the low price at which they can be purchased (£2. 2s.) is considered, surely no private family ought to be without one.—*8th January, 1851.*

WM. SHALDERS, EXHIBITOR,
RINGERS STREET, TOMBLAND, NORWICH

Shalders has copied machine.
This Pump is free from Friction and Leakage and
This is the Pump.—Professor Farington.

INVALID CHAIR

The Morning Advertiser.

A small vessel called the "Wear," lying near the Thames Police Station, was the *corpus vile* selected for the experiment, and her hold was well filled with the most combustible materials that could be gathered together. 20 sugar barrels, 12 turpentine and tar barrels, a large number of saltpetre barrels, and an immense quantity of shavings, were piled up in the bowels of the ship, and after having been inspected by the gentlemen present, were ignited at the bottom. The hatches were then closed for about 12 minutes to allow the fire to get a firm hold of the mass of combustible matter below. On their being opened, a body of flame instantly rushed into the air to the height of about 15 feet, attesting the strength and fury of the fire. The application of the Annihilator produced an instantaneous effect on this vast body of flames. In the course of a minute or two it was apparently suppressed, but the fire having been allowed to gain such a hold, it occasionally burst forth in different parts, and it was not finally extinguished till after the lapse of about 10 or 12 minutes. At the expiration of that time, one of Mr. Phillips' assistants made his way into the hold from the after part of the vessel, and came up by the hatchway, from the midst of the charred and smoking mass below, apparently without the slightest difficulty of breathing, or inconvenience of any kind. The inventor was warmly complimented on the success of this experiment. 24th December, 1850.

The fire was allowed to rage without controul for some minutes, and at a signal given, Mr. Phillips' men brought two portable machines, each about the size of a nine gallon barrel, containing the annihilating vapour that was to be applied to extinguish the fire. The machines were immediately set in operation, a process that was instantly carried into effect, and in less than three seconds the vapour which escaped through a spout attached to each machine, overcame the great body of flame, and the fire was extinct. In about two minutes afterwards the vessel was clear of all smoke. The extraordinary result which followed the application of the vapour to the fire was followed by loud cheers from all present. The experiment was eminently successful. That the invention is one of the greatest value to ships on fire, is beyond doubt, and it may be observed that one of the merits is that the vapour used is perfectly innoxious. 8th January, 1851.

Yesterday afternoon, at two o'clock, Mr. Phillips gave a public demonstration of the efficacy of his new invention for extinguishing fires, at the Blackwall railway pier. The vessel on which the experiment was made, the Wear, of 150 tons, was laid close alongside the pier, and the whole of the arrangements were made in the presence of a numerous concourse of persons, who showed much curiosity during their progress, and were apparently highly gratified with the speedy manner in which the flames were subdued. There was nothing different in the demonstration of yesterday to those we have already noticed. The fore hold of the vessel was filled with pitch, tar, turpentine, saltpetre, and rosin-barrels, plentifully intermixed with shavings and other combustible materials. At a signal from the patentee this mass of inflammable matter was ignited at the bottom, and the hatchway closed on deck for about five minutes, in order to give

the fire time to spread and take a thorough hold. On the removal of the covering and the admission of the external atmosphere, the flames immediately made their appearance, and aided by a brisk wind which was blowing at the time, ascended to a great height. The fire was allowed to burn with great fierceness for some minutes, in order to show the perfect command over it which is conferred by Mr. Phillips's invention, though, as he remarked, in the case of a fire taking place on board a vessel at sea, no time would be allowed for it to spread, and there need not be any large or continuous admission of external air to feed the flame. This was merely done on board the "Wear" to prove the capabilities of the invention under the most adverse circumstances. In about ten minutes from the commencement of the fire, and when the flames were at their greatest height, two of the machines were brought to bear upon it, and discharged the gas with which they were filled into the hold with great force. The effect was instantaneous. The flames sank beneath the deck immediately, and by the application of two more machines the fire was thoroughly extinguished in about twenty-five minutes from the time it was first kindled. The result of former experiments was to produce a strong impression in favour of the "Patent Fire Annihilator," as being peculiarly adapted to the use of ships, and the public demonstration of yesterday confirms that impression. With a proper supply of machines and the prepared material, it seems to our reporter that the spread of fire on board vessels, either in dock or at sea, would be rendered all but impossible, and we were assured by the patentee that the cost of both would amount to a comparatively trifling per centage on the tonnage and cargo of sea-going ships, with this advantage, that the material from which the gases are eliminated being solid, can be easily kept in boxes or on shelves, and does not deteriorate by exposure to any climate. Another and most important peculiarity connected with the invention is the rapidity with which persons may enter the hold of a ship or the interior of a house, immediately after the fire is subdued, without any defence or covering, and without any danger of being stifled by the smoke arising from the smouldering and charred materials. The advantage of this is obvious. Any danger of a fresh outbreak can be at once effectually prevented. At four o'clock Mr. Phillips made a second experiment, with similar results, to the great satisfaction of all assembled:—29th January, 1851.

The Sun.

A very pretty model of an East Indiaman was exhibited, likewise charged. Flame was applied to the ship, and the fire raged fore and aft with great violence. The vapour was again employed, and with similar success. It is solacing to the feelings to contemplate any means of protection against the horrors of a ship on fire during its voyage, having regard only to the ordinary crew, but to imagine such a calamity happening to an emigrant ship, such, for instance, as the ill-fated Ocean Monarch, crowded with passengers, how truly may this prevention be termed invaluable. It is well known, that on such occasions it is found impracticable to apply water to the part of the hold where the fire may be, but as the principle of this invention is the emission of a humid vapour with prodigious force, it would necessarily penetrate all the interstices between the articles of the cargo, and not only

It is ...
Shalders has copied nature and Leakage ...
This Pump is free from Friction and ...
This is the Pump.—Professor Hartington.

EXHIBITOR, WM. SHALDERS, ...

... STREET, TOMBLAND, NORWICH

INVALID CHAIRS

effectually save the ship, but preserve many hundred human beings from a fate too horrid to contemplate, and from which escape might otherwise prove hopeless.—19th July, 1849.

The Shipping Gazette.

If the full measure of Cæsar's celebrated epigrammatic boast "*Veni, vidi, vici*," can be applied to a modern conqueror, it may without partiality be awarded to the individual who—finding the hold of a ship filled with the most combustible matter entirely wrapped in flames, the work of destruction pervading every interstice of the cargo, and threatening momentarily to "leave not a wreck behind"—can bring in his hand a vessel of a compass of from four to five cubic feet, so charged with a vapour generated in an instant by turning a tap, or withdrawing a bolt, that the insertion of a connecting tube into the said burning mass will at once control the devouring element and dissipate every trace of ignition. Such was literally the result of the two experiments tried, in the presence of a multitude of spectators, on board the hull of the "*Wear*" yesterday, moored off the Brunswick Pier, Blackwall. This old vessel of 150 tons burthen, admitting air through every seam above water-mark, had her fore-hold filled with sugar hogsheads, turpentine barrels, saltpetre casks, and sundry bags of the most inflammable nature, the whole being stuffed with light shavings. This for the earlier exhibition at two o'clock. At the appointed time a man placed a flaming link at the aperture cut below, from the after-hold, a draught being thus created, to make the work of combustion the more complete and speedy, and a raging fire was immediately set up. Mr. Phillips then proceeded to address the spectators, and it was singular to observe the self-possession of the crowd of gentlemen assembled on the deck of the vessel, who one and all seemed to have no more apprehension of personal danger from the flames beneath them, which made the standing place rather warmer than when they first came on board, than the more distant spectators on the quay. The inventor explained the obvious axiom, that when fire was discovered in the hold of a ship, every exertion would be at once made, every aperture closed, and every appliance brought to bear to combat the devouring element at the onset. But he would not do so in this case; he would open the hatchway, let every part of the contents be thoroughly ignited, and when the flames had acquired the greatest intensity, then endeavour to quell them—but first they should be seen rising far above the deck. There was no mistake about this, nor did the operator go below to insert the tube, or to apply any remedy from a neighbouring compartment, as this might be of doubtful practicability in a loaded ship at sea; he, therefore, ordered the two men who bore the machines, to work where they might be seen. The knobs were knocked out, the vapour poured furiously from the aperture, and being pointed at the burning mass, traversed the whole, threw off the flames, and rendered the salvage non-susceptible of re-ignition: the whole was quenched, and the charred materials thrown out upon the deck, within eight minutes of the time when the fiercest heat prevailed, and the remedy was brought to bear. We must not qualify our report on the triumphant success which attended the exhibition; parties who have property and lives at stake may have, on land or at sea, a certain and easily employable fire annihilator, and they must judge how far they are

mers against themselves, if they neglect to provide it. Among the numerous persons who witnessed the experiments, we noticed Captain A. R. N., Captain Sparshot, R.N., Lieut. Rigmaden, Oliver Laing, Esq., master builder, Woolwich, Captain Shea, H.C.S., Colonel Brotherton, George Rennie, Esq., C.E., Captain T. P. Clarke, Lieutenant Eyton, with a detachment of the boys of the Royal Marine Society, H. J. Hall, Esq., R.N., of the Marine Board, J. Ledger, Esq., and a number of other practical and scientific gentlemen, whose avocations render them critical judges of the invention. It is calculated that two or three of the new machines, about twice the size of an ordinary pail, would be amply sufficient for a frigate, should she be on fire.—*January 29, 1851.*

We attended another demonstration of the powers and applicability of this wonderful invention at Milbank on Tuesday last, the spot chosen (Messrs. Johnson's stone-yard) being especially for the convenience of members of the legislature and other public men. Our business in attending these experiments frequently is to find out cause of failure, should such occur; but the more we see of the operation, the more we are convinced of its unerring certainty, rendered also more valuable by the facility with which it is applied under every conceivable circumstance which may attend a conflagration. The first exhibition was in a wood-framed house, filled with planking and shavings saturated with turpentine and tar; when fiercely ignited, the flames pouring out at the windows and through the roof, the application of two hand machines quenched the fire completely in three minutes. The second trial was on a tank, twenty feet long and nine feet wide, constructed of wood, and filled with gas tar; this, the most inflammable material known, was set fire to, and allowed to attain the greatest possible intensity, driving the spectators to a distance: a stream of vapour directed from one machine chased away the flames; and this experiment, like the first, was completely successful. The third, however, was a more important affair, and the more particularly interesting to us, as it is to the shipping interest that we would earnestly commend the invention. The hold of a vessel of about 150 tons, moored off the wharf, was filled with sugar hogsheads, turpentine barrels, rosin barrels, &c., all being filled with shavings, on which turpentine and rosin was plentifully sprinkled; the whole was set light to from below, and the hatches opened to give the fire firmer play. When the combustion was complete, and the flames ascended high above the decks, two men, each bearing a No. 3 machine, by simply directing the nozzle of the apparatus to the aperture, succeeded in dispelling every trace of burning in far less time than it takes us to record the fact; and as the vapour in this case descended to do its extraordinary work of annihilating the mighty antagonistic element, it was indubitably manifest to every beholder, that it might with ease and certainty be applied under every possible contingency on shipboard, both life and property being rescued from the awful danger all but instantaneously on the application.

The following are the names of those among the spectators whom we could recognise: the Marquis of Tweeddale, the Earl of Home, Viscount Strangford, Lord Burghley, the Earl of Mulgrave, Viscount Gage, Lord Naas, Lord Clarence E. Paget, Messrs. Wm. Brown, M.P., S. Child, M.P., Chas. Coward, M.P., Gen. Dundas, M.P., Hon. J. E. Elliott, M.P.,

EXHIBITOR, WM. SHALDEK, JUNR.
INGERS STREET, TOMBLAND, NORWICH

It is free from ...
Shalders has copied nature and ...
This Pump is free from Friction and Leakage and is not ...
This is the Pump.—Professor Hartington.

INVALID CHAIRS

Wyndham Goold, M.P., Jas. Heald, M.P., E. J. Hutchins, M.P., C. A. Moody, M.P., R. Perfect, M.P., Melville Portal, M.P., A. O. Brien, M.P., Stafford, M.P., G. Sanders, M.P., H. Lowther, M.P., Captain Elliott, R.N., Captain Lord J. Hay, Hon. Captain Hotham, R.N., Captain Bosanquet, R.N., J. W. Bosanquet, Saml. Smith, Elhanan Bicknell, J. Freeman, and J. Freeman, jun., Esqrs. We believe and hope that, from such an assemblage, patronage, as substantial as it is well deserved, will reward the inventor's enterprise.—*22d March, 1851.*

The Reporter.

After last week's experiment on the ship "Wear," off the Folkestone House, Blackwall, no emigrant vessel should be allowed to leave the docks without being provided with Phillips's Patent Fire Annihilator. How often in ships laden with coal or cotton, do we hear of the spontaneous generation of fire in the hold, to get at which is impossible, much less to extinguish it, and ship, cargo, and too often crew, are consequently lost. Now in a vessel armed with Phillips's Patent Fire Annihilator, what would be the consequence? Let us see what has happened in the case of the "Wear." "The main hatchway was opened, and instantly a volume of flame issued from below, threatening speedy destruction to the vessel, and compelling the visitors on board to seek safety in the boats alongside. In the course of a minute or two, two men were observed making their way through the smoke to the open hatchway, each carrying one of the Portable Fire Annihilators. Simultaneously the bottle-like mouths of these machines (which are not much larger than two gallon bottles, and not unlike them in their proportion) were then directed into the hold, the vapour generated in them was discharged with a force, according to the statement of the Inventor, of twenty horse power, and, as if by magic, the flames disappeared, and in an incredible brief space of time the fire was wholly extinguished. The materials with which the chamber of the machine is charged, is stated to be gypsum, charcoal, and nitre, made up into a solid body, and placed over a small reservoir of water. Into this an inverted phial is placed, containing chlorate of potash and sugar, and in a hollow globe at the nether end, a small quantity of sulphuric acid. By pressing a small wire this chamber is broken, and the contents being distributed amongst the other ingredients, a vapour is created, which, being turned upon the fire, instantly puts it out." What more can be desired? It has now become the duty of government to take up this invention and enforce its use by some stringent regulation in all cases where government can claim a right to interfere.—*January 11, 1851.*

Report by Assistant Surveyors of the Navy.

Copy—Department of the Surveyors of the Navy,

Admiralty, Somerset House, 30th December, 1850.

Having witnessed the experiment made on Monday last, at Poplar, to test the efficacy of Mr. Phillips' Patent Fire Annihilator in extinguishing the flames produced by the burning of a mass of shavings and light wood.

On the hold of a vessel, we beg to report that we are quite satisfied with the result of that experiment, and that we have no doubt of its efficacy in subduing flames in a confined space.

(Signed) J. W. EDGE,
ISAAC WATTS,
Assistant Surveyors of the Navy.

Certificates by Captains R.N. & Merchant Service.

[Copy.] London, 30th January, 1851.

We certify that we were present at the Demonstration which took place on Tuesday last, off Brunswick Wharf, Blackwall, to test the powers of Phillips's Patent Fire Annihilator, when a vessel, having her hold filled with sugar hogshheads, pitch, tar and rosin barrels, shavings, and other inflammable materials, was ignited, and after having been suffered to blaze up to an alarming extent, the flames were extinguished without difficulty by the Fire Annihilator. It is therefore our opinion that the invention is a most valuable and efficacious discovery for the preservation of life and property at sea.

(Signed) Thomas Pickering Clarke, Capt., R.N.
John Sykes, Capt., R.N.
E. Sparshott, Capt., R.N.
Thomas Eyton, Lieut., R.N.
H. J. Hall, Lieut., R.N.
James Rigmaiden, Lieut., R.N.
Charles Shea, Capt., H.C.S.
Thomas Dickinson, Capt. R.N.

West India Captains.

William Barclay,—Ship "Thames."
Peter Slader.

Charles Francis, Esq.
Sir,

7, Brunswick Terrace,
Camberwell.

I did witness the experiment made by the Fire Annihilator, and think it a very valuable invention, and assert that had we have had three or four of the machines on board the "James Pattison," at the time she met her destruction, I individually could have saved that fine ship and valuable cargo, which I think was estimated somewhat near £60,000.

Your obedient Servant,

(Signed) M. H. KNIGHT,
Chief Mate of "James Pattison."

Note.—In September, 1839, the "James Pattison," being on her voyage from Bombay, with a cargo of cotton which ignited, was burnt to the water's edge.

Certificate by Rear-Admiral A. B. Sharpe.

U.S. Club, Pall Mall, 12th April, 1851.

Having attended several times the Demonstrations of the Fire Annihilator invented by Mr. Phillips, I do not hesitate in giving an opinion that

[illegible]

INVALID CHAIRS

it ought to be introduced on board shipping of every description, all houses and warehouses, and particularly in those in which Tallow, Pitch, and such inflammable matters are used.

(Signed) *[Signature]*

A. B. SHARPE,
Rear-Admiral.

Certificate by Rear-Admiral Sir Andrew P. Green.

United Service Club, Pall Mall, 24th April, 1851.

Having witnessed some of the experiments made by the Fire Annihilator and the success produced on all these occasions, I am fully of opinion that no Ship should be allowed to proceed to sea without being provided with a sufficient quantity of these machines,—particularly such as are loaded with combustible cargoes.

(Signed) *[Signature]*

A. P. GREEN,
Rear-Admiral.

THE PRICES OF MACHINES AND CHARGES.

No.	Size of Machine.		Price, including			Price of each		
	Height.	Diameter.	One charge.			Spare Charge.		
			£	s	d	£	s	d
No. 1	16 in.	8 in.	2	2	0	0	5	0
2	18 in.	9 in.	3	0	0	0	7	6
3	20 in.	10 in.	4	0	0	0	10	0
4	22 in.	11 in.	5	0	0	0	12	0
5	24 in.	12 in.	6	0	0	0	14	0

The Machines can be made to order of any size, at a proportionate price

All Communications are requested to be addressed to the Committee of Management, or to the Secretary, at the Offices of the Company, 105, Leadenhall Street, City.

March, 1851.

FIRES EXTINGUISHED

BY

PHILLIPS' PATENT

FIRE ANNIHILATOR MACHINES.

1. Fire at the works of the Imperial Patent Wadding Company, Manchester, extinguished by use of Machines kept on the premises.

Copy of a Letter addressed by W. Bates, Jun., Esq., the Managing Partner, to Mr. Phillips, the Patentee and Superintendant of the Fire Annihilator Company.

Zara Street Mills,
Manchester, 2nd April, 1851.

SIR,

We have much pleasure in adding our testimony to the great value of your invention—the Fire Annihilator. Owing to the great heat required in the manufacture of our goods, and the consequent liability of the material to ignite, *the Insurance Offices have always refused to insure our premises even at the rates paid for the most hazardous trades*; now, however, we consider ourselves perfectly safe; for in addition to your apparatus, we have both steam and water conveyed in pipes to all parts of the building, *but we consider the Annihilator will be able to put out any fire that may hereafter occur. One that took place in January last was put out in about five minutes by three charges (although it spread, with the rapidity of gunpowder, a distance of 150 feet), and the men were enabled to resume work in an hour afterwards.*

Two other very great advantages the Annihilator possesses: the vapour enables persons to breathe in the room where the fire is, and the apparatus can be used without causing the least damage to the machinery, as is the case with both steam and water.

From the experience we have had of the Invention, we have no hesitation in saying, that even the Portable Machines will be found sufficient to extinguish any fire, if applied immediately on its outbreak.

We are, Sir,

Yours respectfully,

Per pro the Imperial Patent Wadding Company,

(Signed) WILLIAM BATES, Jun.

W. H. Phillips, Esq., London.

P.S. You are at liberty to make what use you please of this letter.

* * The Portable Machines used, were three of size No. 4.

WM. SHALDERS, JUNR.
EXHIBITOR,
PRINCE & Co. PRINCE'S STREET, TOMBLAND, NORWICH

It is free from
Shalder's has copied nature and is not
This Pump is free from friction and Leakage and is not
This is the Pump.—Professor Farington.

INVALID CHAIRS

2. £20,000 worth of pictures, and other valuable property rescued at the recent destructive fire at the Thames Bank Depository, by use of a Machine.

Copy of a letter addressed by Mr. Smith, the Manager of the Thames Bank Depository, to Mr. Phillips.

MR. PHILLIPS,
SIR,

Thames Bank Depository,
9th May, 1851.

I have much pleasure in stating to you, in consequence of the use of one of your Fire Annihilators, we were enabled to enter a room in which was deposited a large amount of property, and rescue a collection of pictures valued at upwards of £20,000, together with a considerable quantity of other valuable property.

You have full liberty to make use of this note in any way you think proper.

I am, Sir,

Yours respectfully,

(Signed) JAMES SMITH, Manager.

* * * The hand machine used was not on the premises, but was fetched from a shop a mile distant, and used when the fire had been raging upwards of three hours.

3. A Fire at a Grocer's on the ground floor, and a Fire at a Pawnbroker's on the third floor, extinguished by firemen of the Fire Annihilator Company, while temporarily stationed with the Manchester Fire Brigade.

COPY OF DECLARATIONS.

I, Thomas Clark, fireman in the service of the Fire Annihilator Company, solemnly declare, that in the month of April last, I was stationed in the Towns' Yard, Manchester, under the orders of Mr. Rose, superintendant of the Manchester fire brigade, in charge of some of Phillips' Patent Fire Annihilator Machines. That on the morning of the 22nd day of April last, at or about two o'clock, a fire broke out in the shop of Mr. Cope, Grocer and Tea Dealer, Bradshaw Street, Shudehill, situate about a mile from the Town's Yard. That I, the said Thomas Clark, proceeded to the spot with the first fire engine. That when we arrived, the lower part of the house was in flames. That the men of the brigade broke open the door, and that the flames issued forth into the street. That then I discharged a Fire Annihilator Machine (viz. No. 5), and three other Machines in succession, and that the flames were entirely extinguished thereby, and that I thereupon entered and walked about the shop; and that, as I was traversing the room, about 1000 boxes of lucifer matches suddenly exploded. That I had used the last Machine I had with me, and was consequently unable to apply any further power. That thereupon Mr. Rose gave orders to his men to turn on the water, and that the same was played into the shop for about one minute. And I, the said Thomas Clark, further solemnly declare, that I have had considerable experience in the use of the Fire Annihilator Machine for extinguishing a large body of fire, and that I am satisfied that if I had been provided with another Machine, or had been assisted by my brother fireman, I could easily have extinguished the fire occasioned by the ignition of the lucifer matches, and that the assistance of the water-engines would have been quite unnecessary. And I, the said Thomas Clark, make this solemn declaration, conscientiously believing the same to be true; and by virtue of the provisions of an Act made and passed in the sixth year of the reign of His late Majesty King William the Fourth, intituled "An Act to Repeal an Act of the present Session of Parliament, intituled, An Act for the more effectual Abolition of Oaths and Affirmations taken and made in various departments of the State, and to substitute Declarations in lieu thereof, and for the more entire suppression of voluntary and extrajudicial Oaths and Affidavits, and to make other provisions for the Abolition of unnecessary Oaths."

The above Declaration was solemnly made and subscribed by the said Thomas Clark, this twenty-seventh day of May, one thousand eight hundred and fifty-one, before me.

(Signed) ELKANAH ARMITAGE,

J. P. for the county of Lancaster.

(Signed) THOS. CLARK.

We, Thomas and John Clark, firemen in the service of the Fire Annihilator Company, solemnly declare, that on Sunday, the fourth day of May, instant, about two o'clock in the morning, we went with a company of the Manchester fire brigade, under the superintendence of Mr. Rose, to a fire that was at that time raging at the house and premises of Mr. Isaac Fineberg, of the Oldham Road, Manchester, pawnbroker. And we further declare, that we took with us six of Mr. Phillips' Patent Fire Annihilator Machines, and that on our arrival at the house, we found the fire was burning with great fury in the upper story, used, as we believe, for containing things deposited as pledges, in which there was a large quantity of different articles, many of which were very inflammable. And we further declare, that immediately on our arrival we ran up stairs with two of the Machines, and were met at the door of the room by a large body of flames.

That we immediately struck the two Machines, the vapour from which enabled us to work our way into the room as far as the windows.

That at the time we entered, the flames had burst through the ceiling, and were rushing through the roof and windows. That we then came out, and that I, Thomas Clark, took another Machine into the room, John Clark following me, and knocking about the parcels.

That I, Thomas Clark, then ran out and brought in another Machine. That by this time the flames were entirely subdued, and Mr. Rose came into the room. And that I, Thomas Clark, asked Mr. Rose what he thought of the Machines, to which Mr. Rose answered "he thought he must report favourably of them, he was very much pleased with the trial." That Mr. Rose then pointed to some remains of the fire smouldering in one corner, and said he had better play his engine upon them; whereupon I, Thomas Clark, told him that I had still two machines left, with which I could easily put them out. That Mr. Rose replied, "No, Clark, I think you have done enough;" and he immediately ordered his engine to be played upon them. And we, the said Thomas and John Clark, further solemnly declare, that at the time Mr. Rose ordered the water to be turned on, the flames had been entirely subdued, and that there was not any difficulty in breathing or conversing in the room, and that we could have put out what fire there was left, with the greatest ease, with one of the two machines that had not been used. And we, the said Thomas and John Clarke, make this solemn declaration, conscientiously believing the same to be true; and by virtue of the provisions of an Act, made and passed in the sixth year of the reign of his late Majesty, King William the Fourth, intituled, "An Act to repeal an Act of the present session of Parliament, intituled, An Act for the more effectual abolition of Oaths and Affirmations, taken and made in various departments of the state, and to substitute declarations in lieu thereof, and for the more entire suppression of voluntary and extra-judicial oaths and affidavits, and to make other provisions for the abolition of unnecessary oaths."

The above declaration was solemnly made and }
 subscribed by the said Thomas Clark and John } (Signed) THOS. CLARK.
 Clark, this twenty-seventh day of May, one } JOHN CLARK.
 thousand eight hundred and fifty-one.

Before me,
 (Signed) ELKANAH ARMITAGE,
J. P. for the county of Lancaster.

I, William Taylor, of Oldham Road, Manchester, Pawnbroker, do hereby solemnly declare, that I was present at the fire on the fourth of May instant, at the premises of Mr. Isaac Fineberg. That the fire took place about two o'clock in the morning. That the fire extended over the whole of upper story. That the fire forced its way through the roof—the fire brigade arrived. That the Fire Annihilator men were the first that ran upstairs with their Machines. That as soon as they discharged their Machines, the fire was instantly extinguished, leaving nothing but smouldering embers. It occupied about five minutes. That immediately after the flames had been extinguished, Mr. Rose came upstairs, when he ordered the water to be turned on the burning embers. That it is my opinion that the damage would have been much greater if the Annihilator Machines had not been there. That my opinion is, further, that if the Annihilator Machines were more generally in use, many fires might be put out without the use of water. And that I recommend such Machines to the use of the public. And I, the said William Taylor, make this solemn declaration, conscientiously believing the same to be true, and by virtue of the provisions of an Act made and passed in the Sixth Year of the reign of His late Majesty King William the Fourth, intituled "An Act to repeal an Act of the present Session of Parliament, intituled, 'An Act for the more effectual abolition of oaths and affirmations, taken and made in various departments of the State, and to

WM. SHALDEKES, JUNIOR,
 EXHIBITOR,
 PRINCE'S STREET, TOMBLAND, NORWICH.

It is free to be copied nature and is not...
 Shalder has copied nature and is not...
 This Pump is free from friction and is not...
 This is the Pump.—Professor J. Armitage.

INVALID CHAIRS

substitute declarations in lieu thereof, and for the more entire suppression of voluntary and extra-judicial oaths and affidavits, and to make other provisions for the abolition of unnecessary oaths."

The above declaration was solemnly made
and subscribed by the said William
Taylor, at Manchester, this twenty-
seventh day of May, one thousand
eight hundred and fifty-one.

(Signed) WILLIAM TAYLOR.

Before me,

(Signed) HENRY TRAPPES,

A Master Extraordinary in Chancery.

I, Robert Hardman, of Sycamore Street, Oldham Road, Manchester, do hereby solemnly declare that I was present at the fire, at Mr. Fineberg's house, in Oldham Road, on the 4th of May instant. That before the Fire Brigade arrived, I assisted to endeavour to subdue the fire. That as soon as the Brigade arrived, the men in the employment of the Fire Annihilator Company ran up stairs with their machines. That the fire was on the top story of the building, in a room used as a storehouse. That I stood on the landing, a few feet below the level of the room.

That as soon as the Fire Annihilator men discharged their machines, the flames were entirely extinguished. That the flames were extinguished before the Brigade hose was brought up stairs. That after the flames were extinguished, there still remained a few smouldering embers. That I think any man, with a few buckets of water, could have put those embers out. That it is my opinion that, had there been a few buckets of water at hand, it would not have been necessary to use the Brigade engine. That I occupied about five minutes to put out the fire. That I heard several persons standing by express their surprise at the speed with which the machines had put out the fire. That the by-standers generally attributed the putting out of the fire to the machines. That two or three of the Fire Brigade men went into the room immediately the flames were extinguished.

That it is my conviction that the damage done by the fire would have been much more than it was if the Annihilator Machines had not been used. And I, the said Robert Hardman, make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of an Act made and passed in the Sixth Year of the Reign of His late Majesty King William the Fourth, intituled "An Act to repeal an Act of the present Session of Parliament, intituled 'An Act for the more effectual abolition of oaths and affirmations taken and made in various departments of the State, and to substitute declarations in lieu thereof, and for the more entire suppression of voluntary and extra-judicial oaths and affidavits, and to make other provisions for the abolition of unnecessary oaths.'"

The above declaration was solemnly made
and subscribed by the said Robert
Hardman, at Manchester, this twenty-
seventh day of May, one thousand
eight hundred and fifty-one.

(Signed) ROBERT HARDMAN.

Before me,

(Signed) HENRY TRAPPES,

A Master Extraordinary in Chancery.

THE PRICES OF MACHINES AND CHARGES.

No.		Size of Machine.				Price, including One Charge.					Price of each Spare Charge.		
		Height.	Diameter.			£	s	d			£	s	d
No. 1	- -	16 in.	8 in.	- -	- -	2	2	0	- -	- -	0	5	0
2	- -	18 in.	9 in.	- -	- -	3	0	0	- -	- -	0	7	0
3	- -	20 in.	10 in.	- -	- -	4	0	0	- -	- -	0	10	0
4	- -	22 in.	11 in.	- -	- -	5	0	0	- -	- -	0	12	0
5	- -	24 in.	12 in.	- -	- -	6	0	0	- -	- -	0	14	0

The Machines can be made to order of any size, at a proportionate price.

All Communications are requested to be addressed to the Committee of Management, or to the Secretary, at the Offices of the Company, 105, Leadenhall Street, City.

PHILLIPS' PATENT FIRE ANNIHILATOR.

VESTED IN A COMPANY COMPLETELY REGISTERED.

FURTHER OPINIONS OF THE PRESS.

The Times.

PHILLIPS' FIRE ANNIHILATOR.—A demonstration of Phillips' Fire Annihilator took place yesterday afternoon, at Johnson's Stone Wharf, near the Penitentiary, Millbank, which was attended by a number of the Nobility, Members of Parliament, and scientific visitors. Among those present we observed the Speaker of the House of Commons, and the following:—Duke of Norfolk; Earl of Ilchester; Earl of Macclesfield; Earl of Mountcashel; Lord Alvanley; Lord Gage; Captain Mervyn E. Archdall, M.P.; Mr. George Dodd, M.P.; Mr. James Farrer, M.P.; Mr. Fitzstephen French, M.P.; Mr. Charles Hay Frewen, M.P.; Mr. Augustus Elliott Fuller, M.P.; Mr. Lawrence Heyworth, M.P.; Mr. William Lockhart, M.P.; Mr. John Mackie, M.P.; Mr. W. A. Mackinnon, M.P.; Mr. William Ord, M.P.; Mr. Frederick Peel, M.P.; Mr. S. M. Peto, M.P.; Mr. Philip Pusey, M.P.; Mr. George Sandars, M.P.; Mr. William Scholefield, M.P.; Right Hon. Robert Vernon Smith, M.P.; Mr. R. A. Thicknesse, M.P.; Mr. William B. Wrightson, M.P.; M. Liebig; M. Dumas; Mr. H. Maudslay. The experiments shown were of the same nature as those detailed on previous occasions, and were very successful. The only difference was, that the building which was ignited was placed in an isolated position in the yard instead of being built up against the wall. From its being well away from any other erection the experiment certainly had a more striking effect. Those who had not witnessed the spectacle before formed a rather close ring round the edifice, but when the flames began to pour out through the windows and crevices of the house, were glad enough to retreat to the further corners of the yard. On the Fire Annihilators being brought forward and set in action, the abatement of the flame was almost instantaneous, and a very short time sufficed to subdue altogether the devouring element. After the mass of flame had been ex-

It is free from
Shalders has copied nature and is
This Pump is free from Friction and Leakage and is
This is the Pump.—Professor i arington.

EXHIBITOR, WM. SHALDEK, JUNIOR

PRINCES STREET, TOMBLAND, NORWICH

INVALID CHAIRS

tinguished, the firemen employed a little water to thoroughly put out the glowing embers which might have given a slightly unfavourable view of the effect of the Annihilator, but we understood Mr. Phillips to say, that after the body of flame was extinguished and the building could be entered with safety, water was very valuable in performing this service, and that it was always desirable to have it as an adjunct, although the other would effect the principal object—that of putting out the flame itself. The other experiment, namely, that of firing a large tank of tar, containing as much as 500 gallons, and putting out the flame by means of the Annihilating Machine, has been fully detailed on a previous occasion. We need only add, that it succeeded admirably, and seemed to give satisfaction to the many spectators, both Foreign and English, present; and it may be mentioned as some proof of the extent of this artificial conflagration that the fire engines arrived at the scene of action shortly after the exhibition terminated, having been led thither by the belief that a fire had broken out.—27th June, 1851.

(EXTRACT FROM CITY ARTICLE.)

There is reason to believe that the Fire which destroyed £100,000 or £150,000 worth of property last Monday at London Bridge, and which was only a repetition of what had occurred in the same vicinity a few months before, might very probably have been immediately extinguished at the previous cost of £4 or £5 for a machine which has long been made known and tested.—27th June, 1851.

THE PRICES OF MACHINES AND CHARGES.

No.	Size of Machine.		Price, including One charge.			Price of each Spare Charge.		
	Height.	Diameter.	£	s	d	£	s	d
No. 1	16 in.	8 in.	2	2	0	0	5	0
2	18 in.	9 in.	3	0	0	0	7	6
3	20 in.	10 in.	4	0	0	0	10	0
4	22 in.	11 in.	5	0	0	0	12	0
5	24 in.	12 in.	6	0	0	0	14	0

The Machines can be made to order of any size, at a proportionate price.

All Communications are requested to be addressed to the Committee of Management, or to the Secretary, at the Offices of the Company, 105, Leadenhall Street, City.

LIST OF PRICES

AT THE

Pimlico Wheel Works, LONDON.

TRADE LIST.

	£	s.	d.
ANDAU, Under Spring COACH, CHARIOT, and HEAVY			
BAROUCHE Wheels - - - - -	per Set	8	8 . 0
LIGHT BAROUCHE and BRITSKA Wheels - - - - -	do.	7	7 . 0
ARENCE Wheels, not exceeding 4-ft. 2-in. in Hind			
Wheels and 3-ft. 6-in. in Front - - - - -	do.	6	6 . 0
BROUGHAM and PHAETON Wheels, not exceeding 3-ft. 10-in.			
in Hind Wheels and 3-ft. 4-in. in Front - - - - -	do.	5	10 . 0
LIGHT BROUGHAM and PHAETON Wheels, not exceed-			
ing 3-ft. 7-in. in Hind Wheels, 10 and 12 Spokes - - -	do.	5	0 . 0
UNDER DUTY PHAETON Wheels - - - - -	do.	4	0 . 0
<hr/>			
TTY GIG, DOG CART, and CABRIOLET Wheels,			
16 Spokes, not exceeding 4-ft. 8-in. high - - - - -	per pair	4	12 . 0
and DOG CART Wheels, with 14 Spokes, from 4-ft. 4-in.			
to 4-ft. 8-in. high - - - - -	do.	4	6 . 0
do. - do. - 4-ft. 0-in. to 4-ft. 4 in. high - - -	do.	4	4 . 0
do. - do. - do. - do. - under 4ft. - - - - -	do.	3	16 . 0

BOXING WITH PATENT OR COMMON BOXES.

	s.	d.
A Set of Wheels, at the Works - - - - -	6	0
A Pair of Wheels, do. - - - - -	3	0
A Set of Wheels, from the Works - - - - -	8	0
A Pair of Wheels, do. - - - - -	5	0
Drawing Boxes, do. - - - - - per Set	2	0

N.B.—Extra Charge for Mail Boxes and Foreign Wood.

JULY, 1851.

WM. SHALDEKS, JUNR.
EXHIBITOR,
RINGS STREET, TOMBLAND, NORWICH

It is free from any...
Shalder has copied nature and arrived at...
This Pump is free from Friction and Leakage and is not...
This is the Pump.—Professor Hartington.

INVALID CHAIRS



LIST OF PRICES
AT THE
PIMLICO WHEEL WORKS,
London.

It is free from
Shaders has copied nature and is
This Pump is free from Friction and Leakage and is
This is the Pump. — Professor Hartington.

EXHIBITOR,
WM. SHALDEK, JUNR.
PRINCES STREET, TOMBLAND, NORWICH

INVALID CHAIRS

LIST OF PRICES

AT THE

Pimlico Wheel Works, LONDON.

WAGGON WHEELS.

		ft. in.	ft. in.	Hind Pair.			Front Pair.		
				£.	s.	d.	£.	s.	d.
A Set of 6-in. Waggon Wheels,		5.4	4.8	—	10.	10.0	..	8.	8.0
Do.	do.	5.4	3.9	—	10.	10.0	..	7.	7.0
Do.	Timber Truck	4.8	4.8	—	8.	8.0	..	8.	8.0
Do.	Stone Truck	3.9	3.9	—	7.	7.0	..	7.	7.0
<hr/>									
A Set of 5-in. Waggon Wheels,		5.4	4.8	—	10.	0.0	..	7.	17.0
Do.	do.	5.4	3.9	—	10.	0.0	..	6.	16.0
Do.	Timber Truck	4.8	4.8	—	7.	17.0	..	7.	17.0
Do.	Stone Truck	3.9	3.9	—	6.	16.0	..	6.	16.0
<hr/>									
A Set of 4½-in. Waggon Wheels,		5.4	4.8	—	9.	9.0	..	7.	7.0
Do.	do.	5.4	3.9	—	9.	9.0	..	6.	6.0
Do.	Timber Truck	4.8	4.8	—	7.	7.0	..	7.	7.0
Do.	Stone Truck	3.9	3.9	—	6.	6.0	..	6.	6.0
<hr/>									
A Set of 4-in. Waggon Wheels,		5.4	4.8	—	8.	15.0	..	7.	0.0
Do.	do.	5.4	3.9	—	8.	15.0	..	6.	0.0
Do.	Timber Truck	4.8	4.8	—	7.	0.0	..	7.	0.0
Do.	Stone Truck	3.9	3.9	—	6.	0.0	..	6.	0.0
<hr/>									
A Set of 3-in. Waggon Wheels,		5.4	4.8	—	7.	7.0	..	6.	6.0
Do.	do.	5.4	3.9	—	7.	7.0	..	5.	5.0
Do.	Timber Truck	4.8	4.8	—	6.	6.0	..	6.	6.0
Do.	Stone do.	3.9	3.9	—	5.	5.0	..	5.	5.0
<hr/>									
A Set of 3-in. Van Wheels,	....	5.0	3.6	—	7.	7.0	..	4.	4.0
2¾-in.	do.	....	5.0	3.6	—	6.	16.0	..	3.
2½-in.	do.	....	4.9	3.6	—	6.	0.0	..	3.
2¼-in.	do.	....	4.9	3.6	—	5.	0.0	..	3.
2-in.	do.	....	4.9	3.6	—	4.	4.0	..	3.

CART WHEELS.

						£.	s.	d.	Boxed.
2-in. Cart Wheels, 5-ft. (14 Spokes)				4	4	0	
Do. do. do. (16 Spokes)	....	....				4	10	0
2½-in. do. do. (14 Spokes)				5	5	0	
2½-in. do. do.	....	....				6	6	0
2½-in. do. do.				6	16	0	
3-in. do. 5-ft 4-in.	....	....				7	7	0
3½-in. do. do.				7	17	0	
4-in. do. do.	....	....				8	15	0
4½-in. do. do.				9	9	0	
5-in. do. do.	....	....				10	0	0
6-in. do. do.	....	....				10	10	0

DRAY WHEELS.

2-in. Dray Wheels, 4-ft. 8-in. (12 Spokes)	3. 15. 0	Painted and Boxed.
2½-in. do. do.	....	....	4. 4. 0
2½-in. do. do.	....	....	5. 0. 0
3-in. do. do.	....	....	6. 6. 0
3½-in. do. do.	....	....	6. 10. 0
4-in. do. do.	....	....	7. 0. 0
4½-in. do. do.	....	....	7. 7. 0
5-in. do. do.	....	....	7. 17. 0
5-in. do. do.	....	....	8. 8. 0

SCOTCH CART WHEELS.

2-in. Scotch Cart Wheels, 4-ft. 8-in. (12 Spokes)	....	....	....	....	....	4	10	0
2½-in. do. do.	....	....	....	....	....	4	15	0
3-in. do. do.	....	....	....	....	....	5	5	0
4-in. do. do.	....	....	....	....	....	5	15	0
5-in. do. do.	....	....	....	....	....	6	6	0
6-in. do. do.	....	....	....	....	....	7	7	0

TIRES at £1. : 1 : 0 per Cwt. from 4-in. to 6-in. both inclusive.

£1. : 4 : 0 per Cwt. from 2-in. to 3-in. do.

*Hand-Made Wheels Repaired and Tyer'd at the Shortest Notice,
on Reasonable Terms.*

July, 1851.

LIST OF PRICES

AT THE

Pimlico Wheel Works, LONDON.

REPAIRS.

Terms—Cash on Delivery.

WHEELS.	SPOKES.	FELLOES.	CONTR. TIRES.	NEW TIRES.
	s. d.	s. d.	s. d.	s. d.
2-in. Van Whls.	1 . 6 each ..	2 . 0 each ..	4 . 0 each ..	55 . 0 per
2-in. Cart Whls.	1 . 6 do. ..	2 . 0 do. ..	4 . 0 do. ..	30 . 0 per
2½-in. Cart & Van	1 . 6 do. ..	2 . 0 do. ..	4 . 6 do. ..	24 . 0 per
2½-in. do.	1 . 6 do. ..	2 . 6 do. ..	5 . 0 do. ..	24 . 0 do
2¾-in. do.	1 . 6 do. ..	2 . 6 do. ..	5 . 6 do. ..	24 . 0 do
3-in. do.	1 . 9 do. ..	3 . 0 do. ..	6 . 0 do. ..	24 . 0 do
3½-in. do.	1 . 9 do. ..	3 . 0 do. ..	7 . 0 do. ..	21 . 0 do
4-in. do.	2 . 0 do. ..	3 . 6 do. ..	8 . 0 do. ..	21 . 0 do
4½-in. do.	2 . 0 do. ..	3 . 6 do. ..	9 . 0 do. ..	21 . 0 do
5-in. do.	2 . 0 do. ..	4 . 0 do. ..	10 . 0 do. ..	21 . 0 do
5½-in. do.	2 . 0 do. ..	4 . 0 do. ..	11 . 0 do. ..	21 . 0 do
6-in. do.	2 . 0 do. ..	4 . 0 do. ..	12 . 0 do. ..	21 . 0 do

COMMON BOXES.

	s. d.
2-inch, Common Boxes, per pair	4 . 0
2½-in. do. do.	5 . 0
2½-in. do. do.	6 . 0
2¾-in. do. do.	8 . 0
3-in. do. do.	10 . 0
3½-in. do. do.	10 . 0
3½-in. do. do.	12 . 0

N.B Hand-made Wheels Repaired and Tyer'd on the shortest notice according to the above Scale.

July, 18

LIST OF PRICES

AT THE

Pimlico Wheel Works, LONDON.

JOB MASTER'S PRICES.

		NET. CASH.			NEW TYERS.		
s.	d.	£.	s.	d.	£.	s.	d.
		Landan, Under Spring, Coach Chariot, Heavy Barouche and					
		Heavy Break Wheels, Boxed - - - - -			8 . 8 - 0		
		Light Coach and Barouche, Light Break and Britska Wheels,					
		Boxed - - - - -			7 . 7 - 0		
1. 6		Clarence and Fly Wheels, Boxed, not exceeding 4-ft. 2-in.					
2. 0		in Hind Wheels - - - - -			6 . 6 - 0		
		Brougham and Phaeton Wheels, Boxed, not exceeding					
		3-ft. 10-in. in Hind Wheels, 12 and 14 Spokes - - - -			5 . 10 - 0		
		Light Brougham and Phaeton Wheels, Boxed, not exceeding					
		3-ft. 7-in. in Hind Wheels, 10 and 12 Spokes - - - -			5 . 0 - 0		
1. 0		Under Duty Phaeton Wheels, Boxed - - - - -			4 . 0 - 0		
1. 0							
		Spring Cart Wheels, Boxed, 16 Spokes - - - - -			4 . 10 - 0		
		Do. do. do. 14 Spokes - - - - -			4 . 4 - 0		
1. 6		Lofty Gig and Dog Cart Wheels, Boxed, not exceeding					
2. 0		4-ft. 8-in. High, 16 Spokes - - - - -			4 . 12 - 0		
		Gig and Dog Cart Wheels, Boxed, not exceeding 4-ft. 8-in.					
		High, 14 Spokes - - - - -			4 . 6 - 0		
		Gig, Stanhope, &c., not exceeding 4-ft. 4-in. High, Boxed -			4 . 4 - 0		
		Do. Do. under 4-ft. - - - Boxed			3 . 16 - 0		

Contracting Tyers - - - - - 4s. per Wheel.

Drawing Boxes from Home - - - - - 2s. per Set.

PAINTING AND VARNISHING, &c., EXTRA CHARGE.

Extra Charge for Foreign Wood and Mail Boxing.

N.N.—Hand-made Wheels Repaired and Tyer'd, at the above Prices.

JULY, 1851.

WM. SHALDEKES, Jnr.
FINGER'S STREET, TOMBLAND, NORWICH

EXHIBITOR

It is free from the...
Shalder's has copied nature and arrived...
This Pump is free from Friction and Leakage...
This is the Pump.—Professor, Kingston.

INVALID CHAIR

THE HISTORY OF THE

REIGN OF KING CHARLES THE FIRST

BY JOHN BURNET

IN TWO VOLUMES.
THE FIRST VOLUME.
FROM THE BEGINNING OF HIS REIGN
UNTIL HIS DEATH.
IN TWO VOLUMES.
THE SECOND VOLUME.
CONTAINING THE HISTORY OF THE
COMMONWEALTH AND THE
REIGN OF KING CHARLES THE SECOND
UNTIL HIS DEATH.
IN TWO VOLUMES.
THE THIRD VOLUME.
CONTAINING THE HISTORY OF THE
COMMONWEALTH AND THE
REIGN OF KING CHARLES THE SECOND
UNTIL HIS DEATH.

LONDON: Printed by J. Sturges, at the Sign of the Gun, in St. Dunstons Church-yard, near St. Dunstons Church, in the County of Middlesex, in the Year 1704.

PLATFORM WEIGHING MACHINES.



Henry Wooley & Son,
PATENTEES AND MANUFACTURERS,
LIVERPOOL.

J. B. WILLIAMS, PRINTER, WHITECHAPEL, LIVERPOOL.

It is free from the ...
Shallers has copied nature and artifice and is not ...
This Pump is free from Leakage and is not ...
This is the Pump. — Professor ...

WM. SHALDERS, ...

EXHIBITOR,

BRIDGE STREET, TOMBELAND, NORWICH

INVALID CHAIR



BY HER MAJESTY'S

ROYAL LETTERS PATENT



HENRY POOLEY & SON'S

PLATFORM WEIGHING MACHINES.

Suitable for every description of Merchandise.

MANUFACTURED ONLY BY THE PATENTEES.

ALBION FOUNDRY LIVERPOOL

LONDON DEPÔT AND AGENCY.

MR. JAMES HOLGATE,

9, ARTHUR STREET WEST,

LONDON BRIDGE.

WEIGHBRIDGES FOR ROADS & RAILWAYS

of any power and dimensions;

AND FITTED WITH POOLEY'S PATENT

FOR RELIEVING THE MACHINE FROM STRAIN OR WEAR

except at the moment of ascertaining the weight.

PUBLISHED BY H. POOLEY & SON'S, 27, MANCHESTER STREET, LIVERPOOL. MAY, 1849

June 11

ment is ... from the machine and arrived at 1 ... and is not made ...
It is free from the machine and arrived at 1 ... and is not made ...
Shallers has copied machine and leakage ...
This Pump is the first ...
This is the Pump. — 1 is first ...
EXHIBITOR, WM. SHALDERS, JUNIOR,
9, ARTHUR STREET, LONDON, NORWICH

AYALD CHARTS



EXHIBITED

IN CLASS 5 OF THE EXHIBITION OF WORKS OF INDUSTRY OF
ALL NATIONS IN 1851.

1.

LOCOMOTIVE ENGINE WEIGHING TABLES (*Pooley's Patent*),

which give the **gross weight**, and also the impact upon the rails of each pair of wheels **and of each wheel separately**. *Their use is to enable the superintending engineer to adjust the springs of engines so as to obtain that amount of tractive power which is consistent with safety from tendency to run off the line at curves.*

Tables ou Ponts-à-Balancer pour les Locomotives (Brevet d'invention de M. Pooley), qui donnent la pesanteur entière et d'ailleurs l'impact sur les rails de chaque paire de roues, et aussi de chaque roue séparée. Leur utilité est à mettre l'Ingénieur qui surveille, en train d'ajuster les ressorts des locomotives quant à obtenir ce total de force de traction qui leur rende capable de faire la circulation des courbes sans la disposition à se mouvoir tangentiellement.

Waage-Maschine für Locomotive (*Pooley's Patent*), welche sowohl das Brutto gewicht anzeigt, als auch den druck, welchen jedes Räderpaar, und jedes

WM. SHALDEKES,
PRINCES STREET, TOMLAND, NORWICH

EXHIBITOR,

It is free from the...
Shallers has copied nature and arrived at the...
This Pump is the free...
This is the Pump.—Professor...
INVALID CHAIR

einzelne Rad auf die Schienen aus übt. Der Nutzen dieser Maschine besteht darin, den leitenden Ingenieur in stand zu setzen, die Federn der Locomotive so zu richten, dass ein solcher Betrag von Zug Kraft erhalten wird, als mit Sicherheit vereinbar ist, wegen der Neigung der Locomotive an Curven von der Bahn abzuspringen.

2.

DRAWING, in Plan and Sections, showing the construction and mode of erecting the above.

Dessein (Plan et Sections), qui montre la structure et la mode d'ériger le ci-dessus

Zeichnung, im Riss und Durchschnitt, den Bau und die Art der Aufstellung obiger Maschine zeigend.

3.

DRAWING, in Perspective, showing the construction of Pooley's Patent RAILWAY WEIGHBRIDGE. The rails being omitted, this drawing will represent the Weighbridge as used for *Carts or Wagons on common roads*.

Dessein (Perspectif), qui montre la structure du Pont-à-Balancer (Breveté de M. Pooley), pour les Chemins de Fer. Omettant les rails ce dessein représentera le Pont à Balancer comme on l'emploie pour les charrettes, et les wagons sur les Chemins ordinaires.

Perspectivische, Ansicht der Construction von Pooley's Patentirter Eisenwäge-Maschine. Wenn man die Schienen weg lässt, so stellt diese Zeichnung die an Strassen gebrauchte Wäge-Maschine für Wagen und Karren vor

4.

DRAWING, in Plan, Elevation, and Sections, of Pooley's Patent Lock WEIGHING ENGINE for weighing Canal Boats and their Cargoes.

Dessin (Plan, Elévation, et Sections), de la Machine à Balancer (Breveté de M. Pooley), pour déterminer la pesanteur des Bateaux à Canal avec leurs cargaisons.

Zeichnung, im Riss, Aufriss und Durchschnitt von Pooley's Patentirter Schleusen Wage-Maschine, um Canal schiffe und schwehre Befrachtung zu wägen.

5.

POOLEY'S Patent Dormant PLATFORM WEIGHING MACHINE, flush with the floor, to weigh from $\frac{1}{4}$ lb. to 2 tons, as used in the merchandise department of the LONDON AND NORTH WESTERN and other Railways, and for general weighing in warehouses. The accuracy of the results by this machine is equal to that of the beam and scales, whilst the economy of labour, space, and cost, is at least 50 per cent. *It is only by such means that the heavy merchandise traffic could be despatched with sufficient rapidity.*

Machine à Balancer Immobile (Breveté de M. Pooley), applanie à terre pour balancer de $\frac{1}{4}$ lb. à 2 tons, comme on l'emploie dans la départemente de merchandise du London and North Western et d'autres Chemins de Fer et pour peser ordinairement dans les magasins. L'exactitude des résultats par cette machine est égale à celle de la balance ordinaire, au même temps que l'économie de travail, d'espace, et de frais; est au moins 50 $\frac{1}{2}$ cent. Ce n'est que par de tels moyens que le trafic de merchandise pesant peut être assez expédié.

WM. SHALDEK, JUNIOR,
EXHIBITOR,
PRINCES STREET, TOMELAND, NORWICH

me at ... from the machine.
It is free from the machine and is not used.
Shalders has copied machine and is not used.
This Pump is free from machine and is not used.
This is the Pump.—Professor ...

Pooley's Patentirter ruhende Plattform Wage-Maschine, eben mit dem Boden um von $\frac{1}{4}$ bis zu 2 tonnen (40 ctr) zu wägen, sie wird in der Güter, Abtheilung der London und North Western und anderer Eisenbahnen gebraucht und dient im Allgemeinen zum Wägen in Läger haussern und Magazinen. Die Genauigkeit, mit welcher diese Maschine wiegt kommt der gewöhnlichen Balken wagen gleich, während die Ersparung an Arbeit, Raum und Kosten aufwand wenigstens 50 o/o beträgt. Nur mit solchen Mitteln ist es möglich, einen starken Güter verkehr mit hinreichender Schnelligkeit zu expediren.

6.

MACHINE of similar principle to No. 5, on wheels, for use on wharfs, &c. to weigh 1 ton.

Machine de principe ressemblante à No. 5, sur des roues que l'on employe sur les quais, &c., pour peser 1 ton.

Maschine, nach ähnlichem Princip construirt, wie No. 5, auf Rädern, zum Gebrauch an werden, &c., &c., wiegt bis zu 1 tonne (20 ctr.)

7.

MACHINE of similar principle to No. 5, as used in parcel offices and shops, to weigh 8 cwt.

Machine de principe ressemblante à No. 5, que l'on employe dans les bureaux à paquets et dans les boutiques pour peser 8 cwt.

Maschine, nach ähnlichem Princip construirt, wie No. 5, zum gebrauch in Kaufläden Gepäck expeditionen, &c., &c., wiegt bis zu 8 centuern.

8.

MACHINE of similar principle to No. 5, for weighing animals, as used by agriculturists, made of various sizes.

Machine de principe ressemblante à No. 5, pour peser les animaux; employée par les agriculteurs. Faites de plusieurs dimensions.

Maschine, nach ähnlichem Princip construirt wie No. 5, zum gebrauch von oeconomen um Thiere zu wägen werden von verschiedenen Grössen gemacht.

9.

MACHINE for counter use, from $\frac{1}{2}$ oz. upwards.

Machine pour contr'usage; de $\frac{1}{2}$ oz. et de suite.

Maschine zum Gebrauch auf Ladentischen; für ($\frac{1}{2}$ unze) und mehr.

10, 11, 12.

DRAWINGS, in Plan and Detail, of the first large Establishment in England of Baths and Wash-houses for the Poor, erected by the Corporation of Liverpool, 1845-6:

Architect: JOSEPH FRANKLIN.

Engineer: HENRY POOLEY, Assoc. Inst. C.E.

A comparison of these Plans with those of the various Institutions which have sprung from this commencement may be useful to Towns where Baths, &c., are desired.

WM. SHALDERS, JUNR.
EXHIBITOR,
FINGER STREET, TOMLAND, NORWICH

It is free from use and arrived at a
Shalders has copied nature and leakage and is not used
This Pump is free from friction and leakage
This is the Pump.—Professor Farthington

INVALID CHAIR

Dessins (Plans et Détails), du premier grand Etablissement en Angleterre de Bains et de Lavoirs pour les pauvres érigé par la Corporation de Liverpool, 1845-6.

Une comparaison de ces plans avec ceux des Institutions diverses qui doivent leur origine à cette commencement peut être utile aux Villes qui désirent à former des établissements semblables.

Zeichnung im Ganzen und Einzelnen, von der ersten grossen Bade, und Waschanstalt für Arme in England errichtet Durch die städtische Behörde in Liverpool, 1845-6:

Eine Vergleichung dieser Pläne mit denen von den übrigen Anstalten, welche aus diesem Anfange hervorgegangen sind möchte sich für solche Städte nützlich erweisen, wo Badanstalten, &c., &c., gewünscht werden.

HENRY POOLEY & SON'S PLATFORM WEIGHING MACHINES.

THE common method of weighing merchandise, more especially when it consists of heavy bodies, or when the articles are, alternately, very ponderous and very light, is one involving great labour, expense, and loss of time, to obviate which has always been a desideratum in commerce.

Many ingenious contrivances, differing in merit, have, from time to time, been produced, the general aim of which has been to reduce labour by dispensing with the handing or lifting of weights altogether, or by reducing those weights to a certain proportional part of the article to be weighed.

Defectiveness, arising from error in mechanical principle, and from carelessness of manufacture, caused extensive prejudice against every attempt of science to accomplish the end desired: a prejudice which was maintained until the introduction of the Platform Weighing Machine, by Messrs. POOLEY & SON, of Liverpool, as Agents and sole Manufacturers under the Patent of the Inventors, Messrs. E. & T. Fairbanks, of the United States of America.

Fourteen years working of the patent discovered points of great importance, wherein improvements were absolutely necessary; and for their invention of these improvements, Messrs. POOLEY & SON have obtained her Majesty's Royal Letters Patent.

Messrs. POOLEY's patented and other improvements on the American Model consist chiefly of

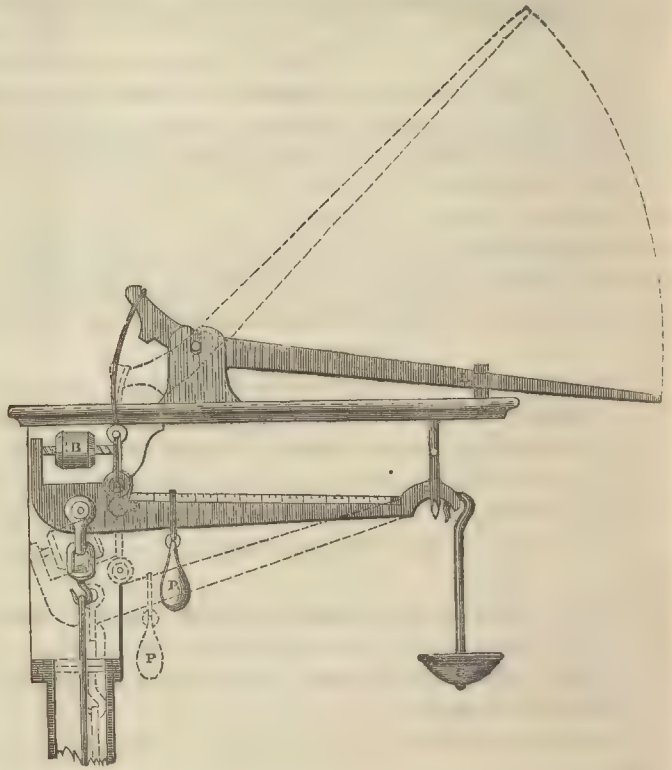
1. *Simplification* of the general construction and arrangement of the levers and other parts.

WM. SHALDERS, JUNR.
EXHIBITOR,
PRINCE'S STREET, TOMELAND, NORWICH

It is free from the ...
Shallders has copied nature and arrived at ...
This Pump is free from friction and leakage.
This is the Pump.—Professor ...

INVAL. D CHA. T.C.

2. *Adjustment.* In the original machine, as in the following diagram



the adjusting ball (B) was in sight and reach of every one, and might be mischievously or fraudulently altered in a moment ; its equilibrium

was, also, frequently disturbed by the working of the hand-lever, and by accidental external causes. The folded diagram of instructions, at the end of this book, shows the new patent adjustment, having the weight (H) concealed within the body of the steelyard, moveable only by a key. It is thus wholly out of sight and reach of meddlers; nor can it be accidentally deranged.

3. *Relief from strain or wear in the Road Machines, or Weigh-Bridges.*

This was long sought for; but the extension of railway goods traffic rendering it necessary for the largest locomotive engines, and heaviest trains, to travel over goods' sidings, and other parts of the lines, where Weigh-Bridges are required, made it imperative that some effectual relief from undue wear, and accidental breakage, should be obtained. Messrs. POOLEY & SON, as contractors for maintaining the weighing apparatus of the London and North-Western and other great railway companies, had a personal interest in the discovery; and they have, by their patent-relieving apparatus, in the simplest and most effectual manner, attained all that can be desired, their Weigh-Bridges, as well as their Platform Machines, being now free from all wear, except at the moment of ascertaining the weight.

The Patentees respectfully ask the attention of the commercial and manufacturing public to the following statement of the claims of their Machine, as compared with the common Scale Beam, and with other Weighing Machines,—

IN A COMPARISON WITH THE BEAM AND SCALES,—It is fully admitted that an equal beam, ACCURATELY constructed, with equal weights correctly adjusted, in the hands of a person who understands its

WM. SHALDERS, JUNR.

EXHIBITOR,
PRINCES STREET, TOMELAND, NORWICH

It is free from the noise
Shalder's has copied nature and arrived at perfection
This Pump is free from friction and Leakage
This is the Pump.—Professor
EXHIBITOR,
PRINCES STREET, TOMELAND, NORWICH

APPALD C-4 95

use, is, without doubt, capable of yielding more accurate results than any other machine whatever.

But, in the practice of trade, so many circumstances interfere with the accuracy of scale beams, partly arising from faults in the beam, partly from incessant wear of the large surfaces of the weights, (even if such weights have once been properly adjusted, which is seldom the case,) and from general ignorance of the just method of weighing, that the presumed accuracy of the equal beam and weight is practically fallacious.

Paradoxical as it may appear to a theorist, it is asserted that, with the patent machine, the general results in the routine of commercial weighing will be at least as accurate as those derived from the equal beam and weight, whilst as regards economy of working, it possesses infinite superiority. Instance the following particulars :

1. *First cost*—it is less by from 25 to 50 per cent.
2. *Time and labour*—more than one half is entirely saved.
3. *Space occupied*—two-thirds are saved ; no fixtures are required for suspension ; and if needful, the machine may be moved at pleasure.
4. *Annual expense*—less periodical adjustment is required ; in most of the modifications the centres are detached from their bearings, and exempt from wear, except during the act of weighing.

IN A COMPARISON WITH OTHER WEIGHING MACHINES the advantages of the patent are very obvious. Those machines have been constructed on several principles, chiefly, 1. The metallic spring ; 2. The hydrostatic balance ; 3. Various combinations of levers.

Respecting the two first, little needs be stated, as it must be evident that they are all liable to constant alteration, and cannot be accurate for any length of time.

The various ordinary lever weighing machines approach the patent

general principle, but they are commonly faulty, and give erroneous results from one or more of the following causes:

1. The rigidity of the fulcrums and points of impact.
2. The vicious arrangement of the levers, which generally swing in opposing directions.
3. Carelessness or rudeness of manufacture arising from *undue competition* at mere price, the knife edges often being untrue, and other important points neglected.
4. Difficulty or complexity of correcting the equilibrium when it may have become deranged by wear or otherwise.
5. Incorrectness of mechanical principle in the construction of that delicate instrument the steel-yard.
6. Uncertainty of placing with precision such poises as are made to traverse the steel-yard on rollers.

From all the above, and many other faults not stated, the patent machine is free, because,

1. All the fulcrums and sustaining points are suspended, and consequently free from friction or rigidity. The knife edged centres are *all in parallel planes*. The levers are as few as possible, are arranged with perfect simplicity, and all oscillate in one direction.
2. The equilibrium is preserved by a simple and peculiar arrangement, the adjustment of which can be understood by a mere child, *but cannot be tampered with*.
3. The steel-yard is a novelty, and is constructed with the greatest care.
4. The poise cannot be placed wrong.
5. The price is so low, as not to be materially more than the commonest machines, and yet so high as not to form a temptation to slovenliness of manufacture.

ment, as ... from the museum and arrived at ... and is not made ...
 It is free from the usual defects of ... and is not made ...
 Shalders has copied nature and Leakage ...
 This Pump is the finest ...
 This is the Pump. — Professor ...
WM. SHALDERS, JUNR.
EXHIBITOR,
 PRINCE'S STREET, TOMELAND, NORWICH

6. It has peculiar facilities for adaptation to the weights of all nations.

THE CART MACHINES, OR WEIGH-BRIDGES, constructed on the patent principle, have many peculiarities. They have only two levers underground, consequently no liability of binding or locking whilst in action; their fulcrums are oscillating props, by which the relative distances and proportions are always preserved the same.

The depth of the pit required is only from 20 to 30 inches.

The space occupied in the office is less than half of what is required by those on the old construction.

The steel-yard indicates at once with precision, and without vibration.

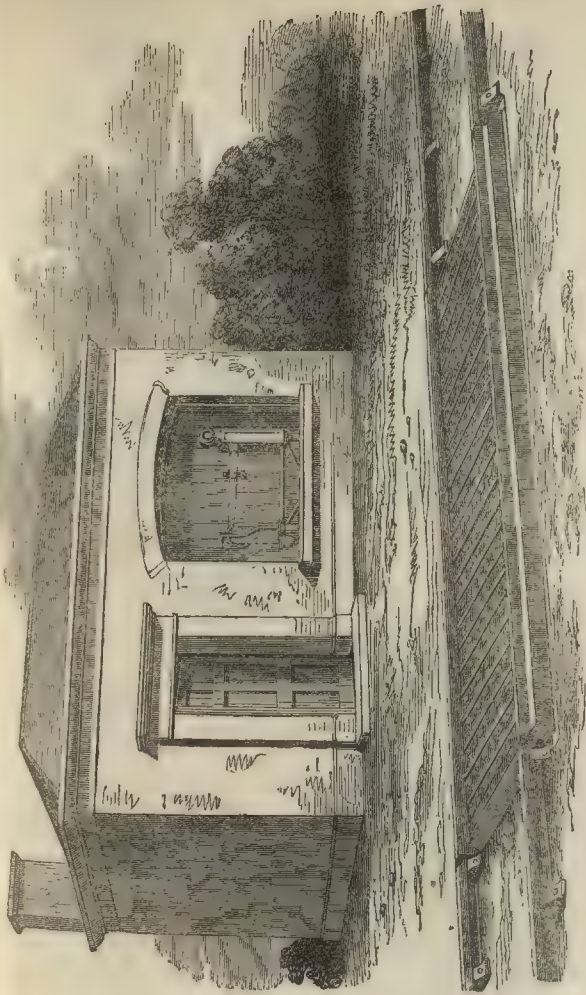
The Patent Weigh-Bridge, made in three divisions, having three connected indicators, with simultaneous action, is applied to WEIGHING LOCOMOTIVE ENGINES, and to guide Engineers in the distribution of the just measure of impact upon the rails, by each separate wheel of the Engine, so as to reduce the danger of running off the line at curves. The Weigh-Bridge, for this purpose, is adopted at the Locomotive Works of the leading Railways in the kingdom.

The best testimonial to the value of Henry POOLEY & SON'S weighing apparatus, is that offered by their adoption in all the departments of the leading lines of Railway in this and other kingdoms.

They are also patronised by her Majesty's Ordnance and Admiralty Boards, and are extensively used by Manufacturers and Merchants.

Albion Foundry, Liverpool,

1st May, 1851.



WEIGH-BRIDGE AND OFFICE,

AS ERECTED BY THE PATENTEES ON THE PRINCIPAL RAILWAYS IN GREAT BRITAIN; ALSO (THE RAILS BEING OMITTED), FOR WAGONS AND CARTS ON COMMON ROADS.

It is free from the ... nature and ... and is not ...

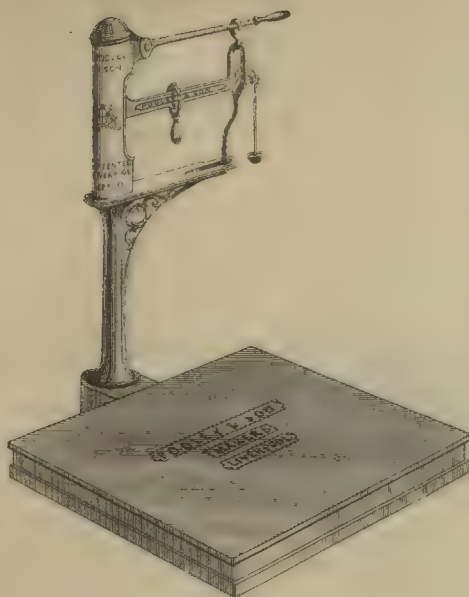
Shalders has copied nature and ... and ...

This Pump is free from ... and ...

This is the Pump. — Professor ...

EXHIBITOR, WM. SHALDEKS, JUNIOR,
PRINCES STREET, TOMELAND, NORWICH

FIG. 1.



X.P. MACHINE. *Portable, for Shops, Parcel Offices, &c.*

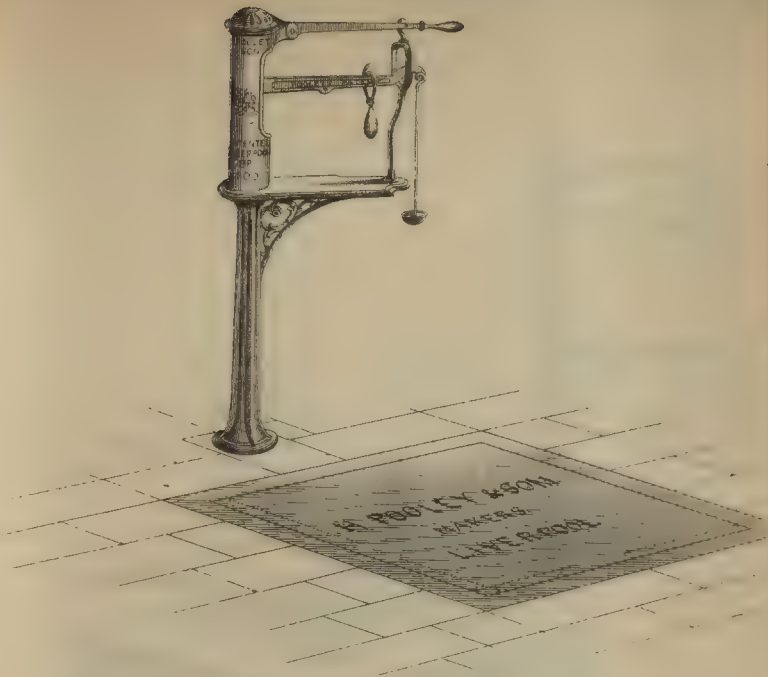
To carry 4 Cwt. 11^{ft} 6ⁱⁿ x 17^{ft} 6ⁱⁿ £
 " 5 Cwt. 2^{ft} x 2^{ft} £
 " 8 Cwt. 2^{ft} . x 2^{ft} £
 " 10 Cwt. 2^{ft} 6ⁱⁿ x 2^{ft} 6ⁱⁿ £

Any of the above may be mounted on wheels.

ment in use ... the machine ... It is free from the machine ... and arrived at present ... is not liable to ...
 Shallders has copied letters and arrived at present ... and arrived at present ...
 This Pump is free from Friction and Leakage ...
 This is the Pump.—Professor Faraday.
W.M. SHALDERS, JUNR.
EXHIBITOR,
 PRINCES STREET, TOMBLAND, NORWICH

W.M. SHALDERS, JUNR.

FIG. 2.



B.P. MACHINE. *Dormant ie sunk flush with the floor.*

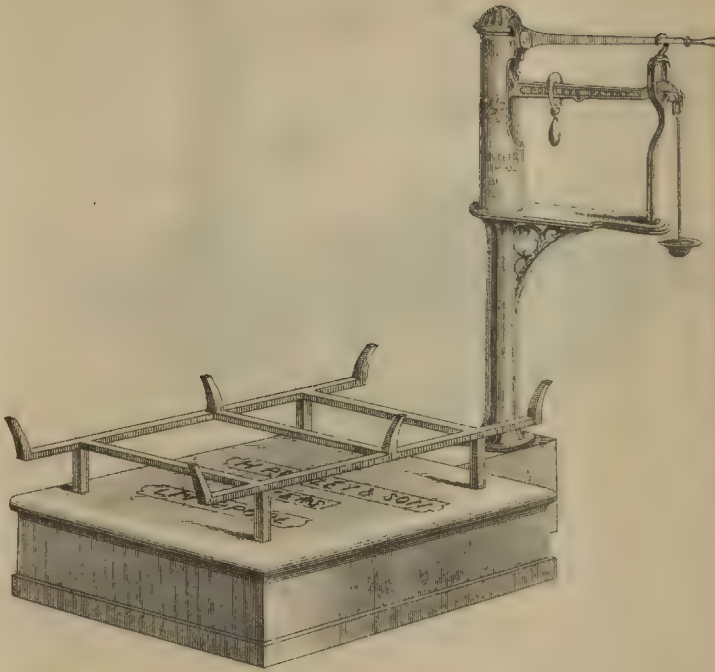
To carry	10 Cwt.	2 f ^t 4 ⁱⁿ x	2 f ^t 4 ⁱⁿ	£
"	15 Cwt.	2 f ^t 9 ⁱⁿ x	2 f ^t 5 ⁱⁿ	£
"	22 Cwt.	3 f ^t ... x	2 f ^t 6 ⁱⁿ	£
"	32 Cwt.	3 f ^t x	3 f ^t	£
"	42 Cwt.	4 f ^t x	3 f ^t	£

Other sizes to suit particular situations.

ment in use.
It is free from the liability of rust and is not liable to
Shalders has copied nature and arrived at perfection.
This Pump is free from Friction and Leakage and is not liable to
This is the Pump. — Professor L. Arington.

EXHIBITOR, WM. SHALDERS, JUNR.
BRIDGE STREET, TOMBLAND, NORWICH

FIG. 3.



B. P. MACHINE. *With frame as adapted to the use of Iron Merchants.*

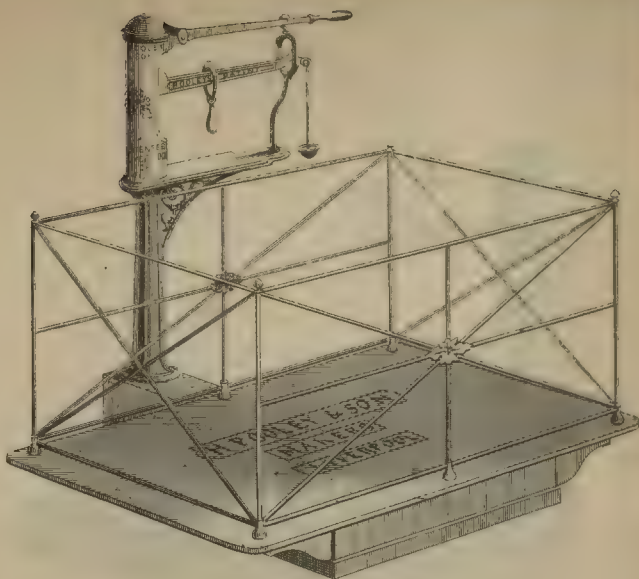
To carry 22 Cwt. . . 3 f^t . . . 2 f^t 6 in . . . 4^t
 " 32 Cwt. . . 3 f^t 8 in . . . 3 f^t 2 in . . . 4^t
 " 42 Cwt. . . 4 f^t . . . 3 f^t . . . 4^t

Other sizes and other kind of appendages to suit particular trades

mean . . . from the machine . . .
 It is free from the machine . . .
 Shalders has copied with Precision and is not more . . .
 This Pump is free from Friction and Leakage . . .
 This is the Pump. — Professor J. Armstrong.
EXHIBITOR, WM. SHALDERS, JUNR.
 PRINCE'S STREET, TOMBLAND, NORWICH

1842. D. CHA. 75

FIG. 4.



C.P. MACHINE. *With Pen to receive Live Cattle.*

and may also be mounted on wheels

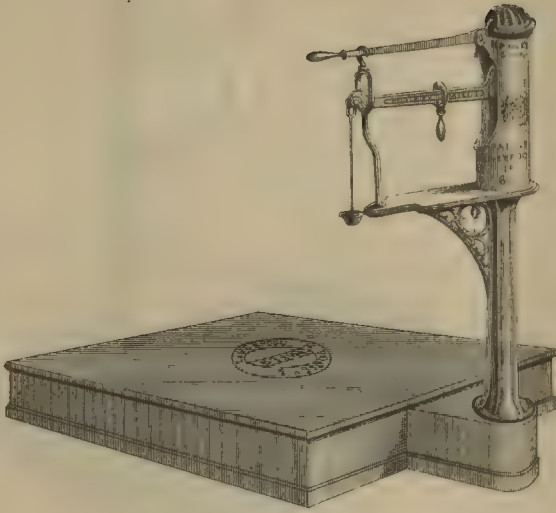
To carry 10 (wt. $-4t^t 2^n \times 2t^t 8^m$ and

Other sizes at proportional prices

ment in use.
It is free from the liability of being lost or damaged, and is not liable to rust or decay.
It is free from the liability of being lost or damaged, and is not liable to rust or decay.
It is free from the liability of being lost or damaged, and is not liable to rust or decay.

1AVALID CNA 95

FIG. 5.



L. P. MACHINE. *Portable or may be mounted on wheels.*

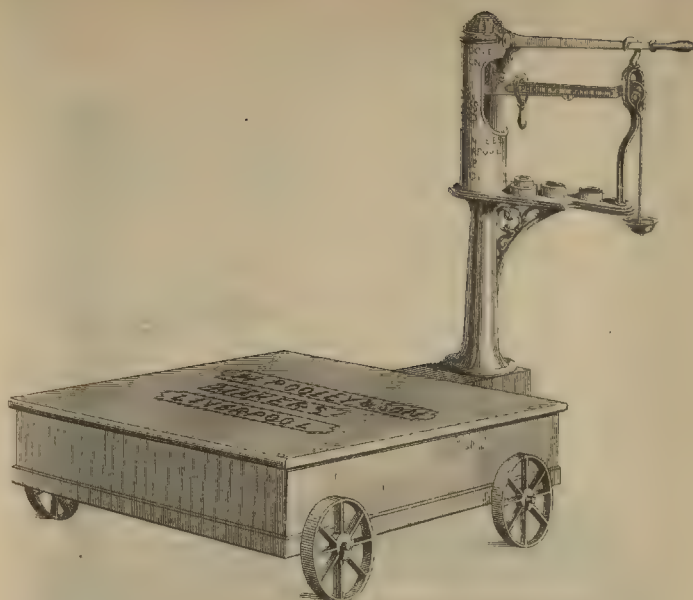
To carry 15 Cwt. 27^{ft} 9ⁱⁿ x 27^{ft} 5ⁱⁿ £¹⁰

20 Cwt. 27^{ft} 9ⁱⁿ x 27^{ft} 5ⁱⁿ £¹

ment in use ...
It is free from the liabilities ...
Shalders has copied ... and arrived at perfect ... and is not liable to ...
This Pump is free from Friction and Leakage ...
This is the Pump. — Professor ...
EXHIBITOR, WM. SHALDERS, JUNR
PRINCE'S STREET, TOMELAND, NORWICH

1844. D. CHA. 25

FIG. 7.



B.P. MACHINE. *Mounted on strong bored wheels and turned axles.*

To carry 32 Cwt. 3 ft. 6 in. x 3 ft. 2 in. £

" 42 Cwt. 4 ft. x 3 ft. £

ment in ... from the ...
It is free from the ...
Shallers has copied ...
This Pump is free from ...
This is the Pump. — Professor ...

WM. SHALDERS, JUNR

EXHIBITOR,
FINGER'S STREET, TOMBLAND, NORWICH

INVALID CHAIRS



HENRY POOLEY & SON'S

PATENT PLATFORM WEIGHING MACHINES, LIVERPOOL.

INSTRUCTIONS.

THE DRAWING REPRESENTS THE HEAD AND STEEL-YARD OF THE MACHINE.

The weights placed on the plate of the counterpoise, C, are for the standard hundred weight of 112 lbs., and are marked 2 for 2 cwt., &c. There is, also, a weight for the $\frac{1}{4}$ cwt., and all the lesser weights, are found by moving the poise, P, along the steel-yard, which is divided by notches into pounds, and quarters.

To ascertain whether the Machine is in a correct state (which should be done *every morning*), let the platform be empty, the weights on the poise, P, put back to O, on the steel-yard. When in this position the machine be correct, the point of the steel-yard will rise a little from the bottom of the guide, and vibrate gently. Should it not do so, it may easily be regulated by means of a small key, K, which is furnished with each Machine. By turning this key in the round hole, you can move the concealed adjusting weight (partly shown in the drawing) backwards and forwards, as may be required.

This new mode of regulation secures the machine from being rendered out of order by mischievous or designing people.

It may, in time, happen that you have moved the concealed weight, and yet the

steel-yard rise too freely; in this case, turn it back as far as it will go, take out the plug of the counterpoise, C, and drop small shot, or bits of lead, into the hole, until it is heavy enough just to bring down the point of the steel-yard.

III.—All the Machines have a lightening lever, marked L in the drawing; when this lever is up, *i.e.*, in the position shewn by the dotted lines, the platform lies solid upon the frame, and the centres are detached from their bearings, so that no friction or wear will take place, even though you roll casks or wheel trucks, &c., on the platform.

In order to preserve the Machine from wear, *it should be always kept in the position last described*, except at the moment of use. When you have put the goods you wish to weigh upon the platform, you may draw down the lever L, which brings the Machine into the position for weighing.

IV.—Let the centres and bearings be kept clean, and free from rust or clammy oil.

V.—In fixing or removing a Machine, be particular to keep it exactly level.

NEW BRITAIN 1822

THE NEW BRITAIN
PUBLISHED WEEKLY
BY J. B. BROWN
AT THE NEW BRITAIN PRESS
NO. 10 N. B. ST. N. Y.

THE NEW BRITAIN
PUBLISHED WEEKLY
BY J. B. BROWN
AT THE NEW BRITAIN PRESS
NO. 10 N. B. ST. N. Y.

EXHIBITOR, WM. SHILLER, PRINCES STREET, TOMBLAND, NORWICH

Shallers has copied...
This Pump is free from Friction and...
This is the Pump.—Professor 1 artington.

INVALID CHA 25

PLATFORM
WEIGHING MACHINE



Henry Pooley & Son,
PATENTEES AND MANUFACTURERS
LIVERPOOL.

Small hole in the back part of the upper road.

It is free from -

Shallers has copied nature and Leakage and -

This Pump is free from Friction and Leakage.

This is the Pump. - Professor Farquhar.

EXHIBITOR, WM. SHALDEN, NORWICH
RINGS STREET, TOMBLAND, NORWICH

INVALID CHA. & C.

DISCUSSION

YORKSHIRE SPORTING CART.



PUCKERING & HOULGATE'S NEWLY IMPROVED SPORTING CART.

CASH PRICE, FORTY-FIVE POUNDS: WARRANTED FOR TWELVE MONTHS.

The Improvement consists of a new method, contrived under the seat, to adjust the Body of the Cart over the axle, so as to regulate the weight on the horse's back with the greatest ease, whilst seated, without the inconvenience of getting out of the vehicle. It has also Improved elastic shafts which move to the stepping of the horse, thereby avoiding that unpleasant knee motion so much complained of, at present, in other Carts.

The Cart is finished in a superior manner with Lamps, Knee Apron, Crests Painted, and other requisites. Gentlemen ordering, can have them lined and painted any colour.

DELIVERED FREE IN HULL,

From whence they can be forwarded at a cheap rate, to any part of the Kingdom.

PUCKERING & HOULGATE,
Coach Builders and Harness Makers.
BEVERLEY, YORKSHIRE.

Carriages, of all descriptions, built on the shortest notice and on the most reasonable terms.

M. Ellis, Printer, Post-Office, Toll-Gavel, Beverley.

PRIZE SPORTING CART,

Awarded at the Yorkshire Agricultural Meeting, held at Thirsk, 1850.

PATRONIZED BY



600 GENTLEMEN.

PUCKERING & HOULGATE'S IMPROVED PATENT SPORTING CART,

EXEMPT FROM DUTY,

CASH PRICE, TWENTY-ONE POUNDS: WARRANTED FOR TWELVE MONTHS

The Improvement consists of a simple contrivance to move and adjust the body of the Cart over the axle, thereby giving the horse the same weight on his back with either two, three, or four persons. The movement is effected by a neat screw, requiring no key. The Cart is very strong, its weight only thirty stone, and will carry four persons, or six cwt.; has patent axle and lancewood shafts, neatly painted, with cushions.

DELIVERED FREE IN HULL,

From whence they can be forwarded at a cheap rate, to any part of the Kingdom.

CARRIAGES OF ALL DESCRIPTIONS LET OUT ON HIRE,
BY THE DAY, MONTH, OR YEAR.

PUCKERING & HOULGATE,

BEVERLEY, YORKSHIRE,

(SUCCESSORS TO MR. OXLEY.)

Coach Builders and Harness Makers.

Carriages built on the shortest notice, and on the most reasonable terms.

M. Ellis, Printer, Post-Office, Toll-Gate, Beverley.

See full list of the back part of the upper part.

WM. SHALDERS,
EXHIBITOR,
PRINCE STREET, TOMELAND, NORWICH

It is free from all noise and vibration and leakage and is a perfect pump. This Pump is free from friction and leakage. This is the Pump. — Professor J. Arington.

WILLIAM CHAPMAN



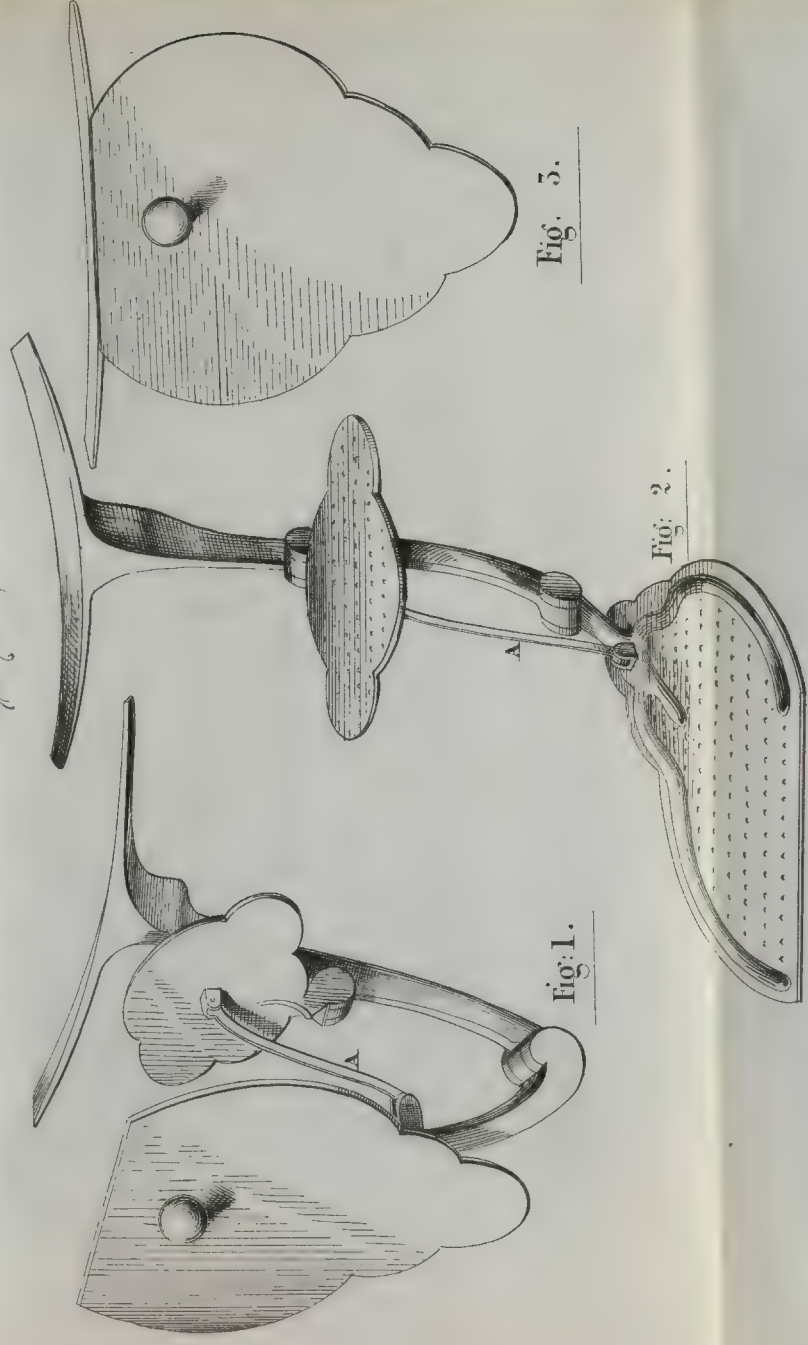


Fig. 1. Represents the Step half open. Fig. 2. The same open.
Fig. 3. The same shut up.

By means of the small connecting rod marked A, both
breads are made to open and shut at the same time, and much
more conveniently than in the ordinary double step.

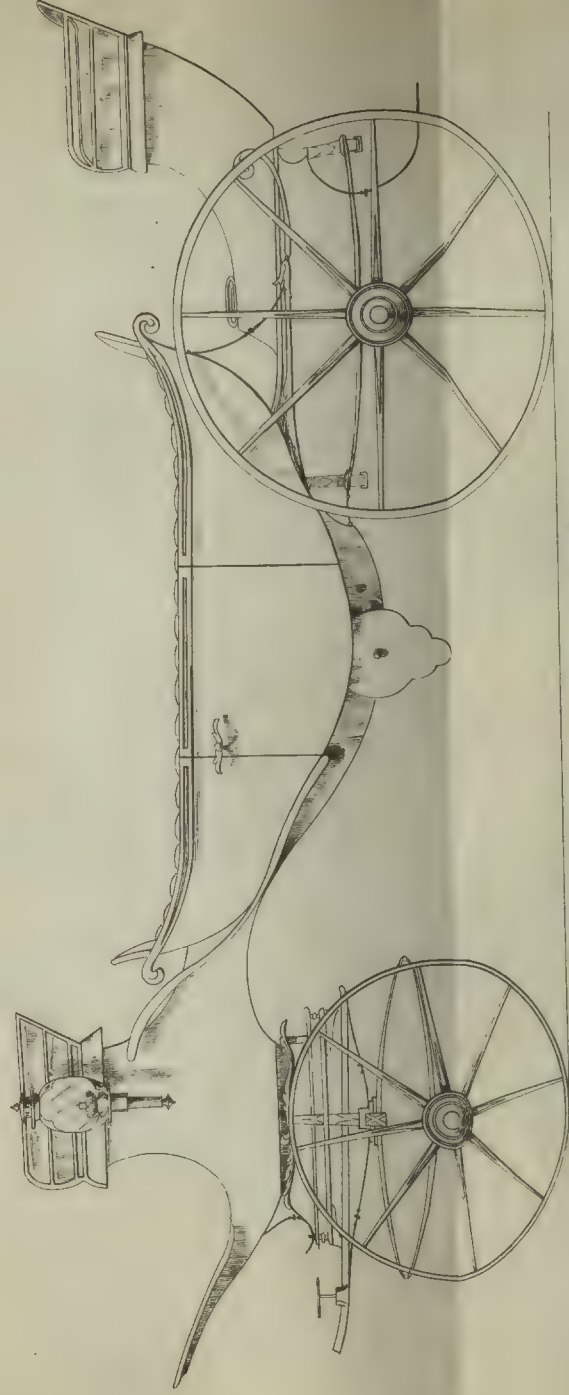
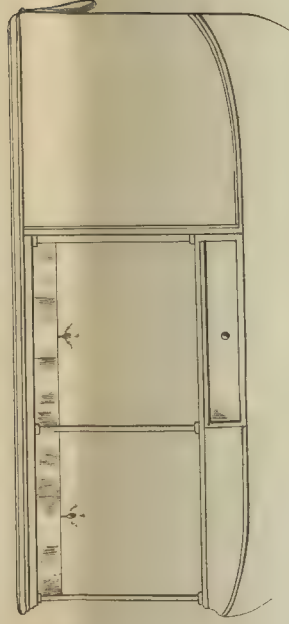
A person sitting inside a carriage, with this step applied, may
if he please, open or shut the step himself, by moving the upper
board, which in most cases is within his reach.
It can also be made to work with the door by attaching a
small lever to the back part of the upper board.

DIOROPHIA.

UNDER
HER MAJESTYS



ROYAL
LETTERS PATENT.



ROCK AND SON,

MASTERS.

PATENTEES AND MANUFACTURERS,

Vehicles

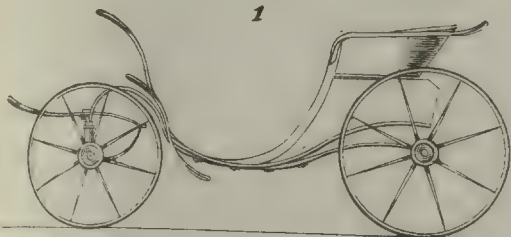
This Carriage unites all the conveniences of three distinct
1 a Chaise, 2 a Barouche 3 a Soutable

The changes are effected by means of a pulley attached to the ceiling of the
Coach house, a cord and a counterpoise which enable one person to remove
either head in two minutes

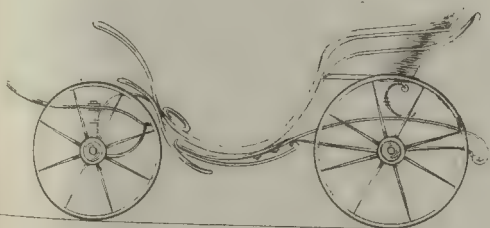
IMPROVED SAFETY PONEY CARRIAGES.

Nº 956, CLASS 5, GREAT EXHIBITION.

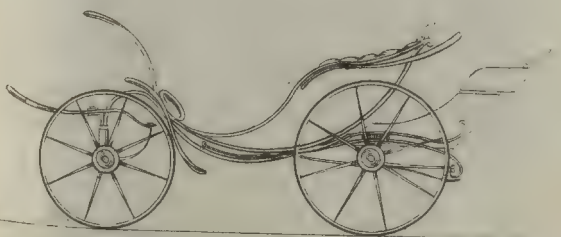
1



2



3



ROCK & SON,
HASTINGS
Inventors & Builders.

BANK FLOOD,

JUNR

Choke.—*JOHN*

ment in the useful

It is free from the liabilities and devices

Shalders has copied nature and arrived at perfection, it is not liable to

This Pump is free from Friction and Leakage and is not liable to

EXHIBITOR, WM. SHALDERS,

EXHIBITOR,

Professor Farthington.

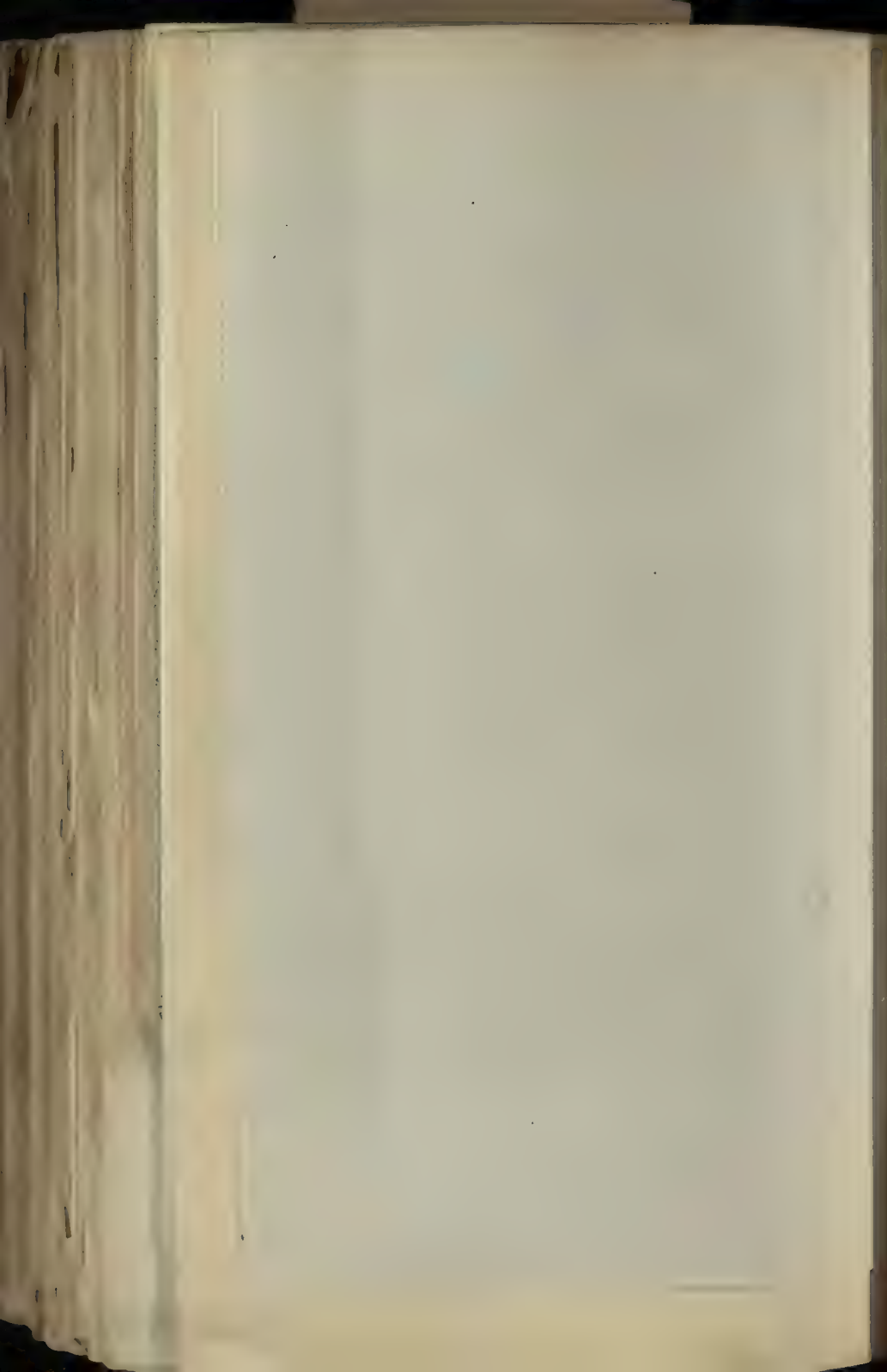
This is the Pump.

TOMBLAND, NORWICH

PRINCES STREET,

& Co.

INVALID CHAIR



UNDER ROYAL LETTERS PATENT.

IMPROVED CARRIAGE

BY

ROCK AND SON,

HASTINGS,

INVENTORS AND MANUFACTURERS.

CLASS 5, No. 956, GREAT EXHIBITION.

THE DIOROPHA.

This Carriage in its most improved form combines all the advantages of three distinct vehicles.

1. A CLOSE CARRIAGE.
2. A BAROUCHE OR HALF-HEADED CARRIAGE.
3. AN ENTIRELY OPEN CARRIAGE.

It is therefore suited for all climates and seasons.

The principle of its construction is so simple that it cannot get out of order, nor can any mistake be made in changing it from one form to another, which operation is accomplished in a few minutes with great ease.

An eye or ring is fixed in the roof of the close Carriage, and made to drop into a recess, out of sight, when not wanted. When the change is to be made, a hook attached to a cord passing over pulleys fixed to the ceiling of the coach-house is passed into the ring, and the head being balanced by a counterpoise at the opposite end of the cord, is raised with the utmost facility, and remains suspended until wanted again. A similar arrangement is used for the Barouche head, and thus one person may effect all the changes, however large the Carriage may be.

The Dioropha may be built of any size and in any style that may be preferred. Its economy is evident from the fact that it costs but little more than an ordinary carriage, although it possesses so many additional advantages.

DIOROPHE.

La Voiture ainsi nommée est d'une espèce tout-à-fait sans parallèle. Elle réunit en elle-même sans perte d'élégance tous les attributs et toutes les convenances de trois voitures distinctes: C'est-à-dire,

1. Une Voiture fermée.
2. Une Voiture à demi-ouverte.
3. Une Voiture entièrement ouverte.

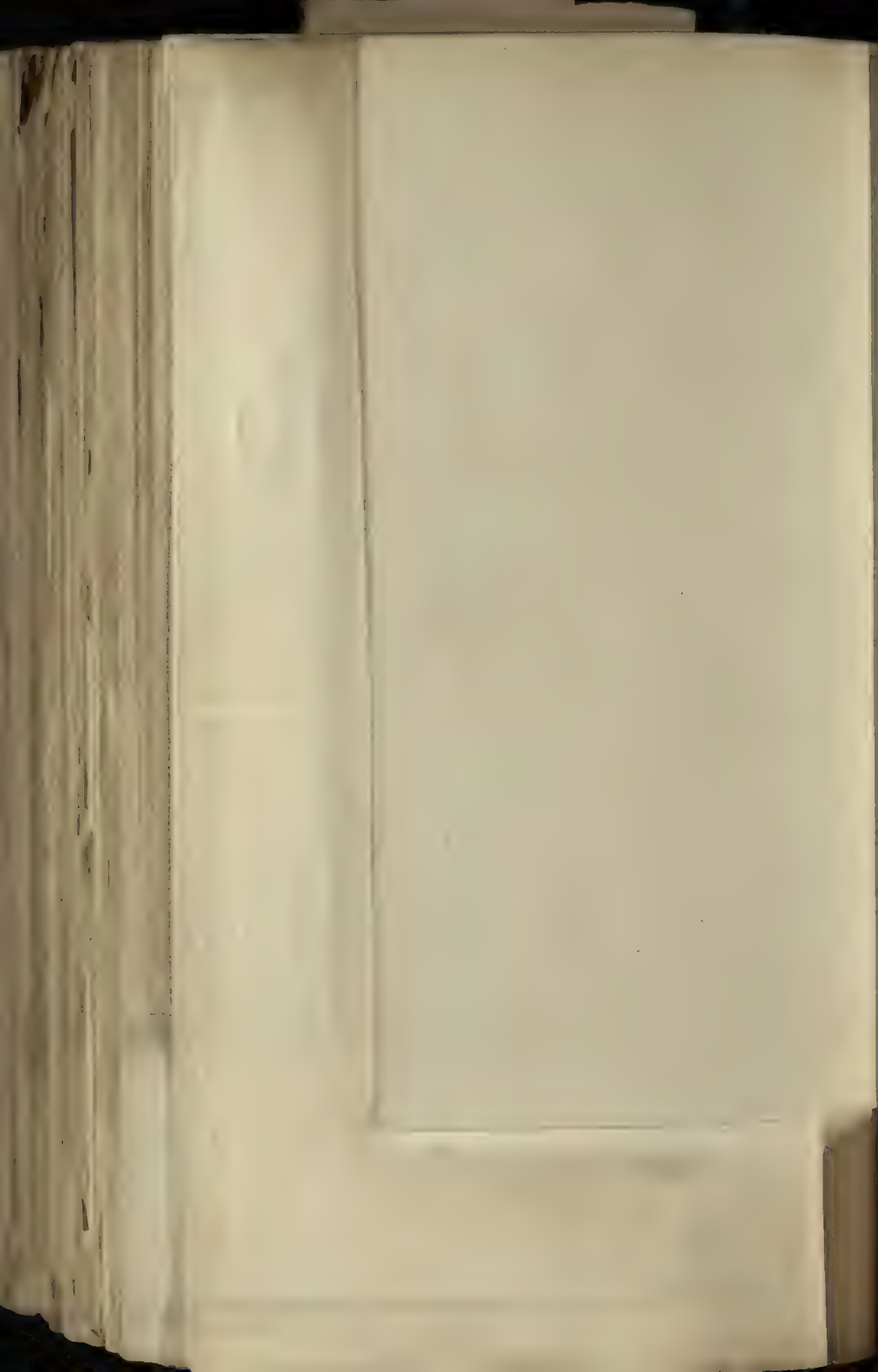
Ainsi elle sert pour toutes les saisons et pour tous les climats du monde.

Le principe de sa construction est fort simple. Il n'emploie pas d'appareils compliqués et difficiles à arranger, mais il reste simplement en divisant la caisse de la voiture à la ligne horizontale et en formant chacune des deux parties de manière à ce qu'elle soit parfaite et entière en elle-même. Ainsi quand le dessus est remué la voiture devient ouverte et pas moins parfaite qu'auparavant. Mais quand on a besoin d'une voiture à demi-ouverte comme une Barouche, la Diorophe est fournie d'une capote en cuir toute garnie comme celle d'une Barouche, et devient parfaite et élégante comme cette voiture. Ces changements sont très-faciles à accomplir. Ils ne demandent qu'une poulie fixée au plafond de la remise, une corde et une contre-poids. Par ces simples moyens un seul homme peut fixer ou remuer le dessus de la voiture fermée sans difficulté et en peu de temps.

La Diorophe est fabriquée dans toutes les formes des voitures ordinaires parceque le principe de sa construction n'empêche pas l'application de n'importe quel dessin.

Son économie est apparente; la Diorophe ne coûte pas beaucoup plus que d'autres voitures, quoiqu'elle réunisse les convenances de plusieurs.

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largest size, it is practicable to
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B. & W. each and every foot
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London Professor to be a Master Piece of Art, a Triumph of Science and a real benefit to Society at Large.
The Fountain Pump is the most important improvement in the Art of raising water that has appeared within the last 2000 years the greatest
The Fountain Pump is the most important improvement in the Art of raising water that has appeared within the last 2000 years the greatest

ment in the useful Arts in modern times.—*Mechanic's Institution.*
It is free from the liabilities and defects of the Friction Pump and approaches a perfect Hydraulic Machine.—*Doctor Birkbeck.*
It is free from the liabilities and defects of the Friction Pump and approaches a perfect Hydraulic Machine.—*Doctor Birkbeck.*

This Pump is free from Friction and Leakage and is not liable to Choke.—*John Hay, Civil Engineer.*
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PRINCE'S STREET, TOMBLAND, NORWICH

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SPECIMEN OF JETS.

1. Basket and Ball Jet.
2. Venus and Mist.
3. Ball Jet.
4. Rose, or Mist.
5. The Dancing Doll.
6. Barker's Mill.

7. Jet with Balls.
8. Dome.
9. Convolvulus.
10. Convolvulus and Dome.
11. Prince of Wales.
12. Barker's Mill and Jet.

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JUNR BANK PLACE, NORWICH.

WM. SHALDEN,
EXHIBITOR,
TOMB LAND, NORWICH

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INVALID CHARGES

PREFACE.

A few words will suffice to introduce the present work. The object of the observations is to draw attention to the use of Fountains as a valuable and desirable decoration to parks, gardens, &c.; to show what nature has done and may accomplish, point out the mechanical contrivances and appliances, and the resources necessary or which may be available, and give an indication for the direction of design. In following the latter purpose, and noticing the examples given in the celebrated Fountains of Versailles, the observations are intended as a guide to the stranger in his visit to that far-famed spot.

 Doctor Birkbeck.

 The Fountain Pump is the most important improvement in the Art of raising water that has appeared within the last 2000 years the greatest saving of power with which any valid objection being raised against it. They yield an immense saving of Society at Large.

 Surgeon Aberdeen.

 John Hey. Civil Engineer.

Wm. Shalders, JUNR BANK PLACE, NORWICH.
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 This is the Pump. — Professor Farthington.

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AND A GUIDE TO

In entering into a consideration of the subject of Fountains, I am aware that I shall have some difficulties to encounter, as so trifling a degree of critical attention has been hitherto bestowed upon their structure in this country. As pleasing to the natural, and conducive to the picturesque, displays of water have long formed objects of attention to our foreign neighbours, of which the celebrated Fountains of Versailles, Rome, Naples, and other parts of Italy, bear ample testimony. Although nothing can be more admired by ourselves than a gush of water in mountain scenery, or the rippling of the fluid in its chalky or stony beds—subjects sung of in the theme of the poet, and always attractive to us in the search of the romantic beauties of nature's scenery—yet, with all the power of machinery at our command, hydraulic embellishments have been but little attended to in this country. Whilst natural forms of fountains and gushing

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They yield an immense saving of Society at Large.

Doctor Birkbeck.

Institution.—Teaches a perfect Hydraulic Machine. — *See* *St. James Aberdour*.

on Pump and approach of the Diaphragm. — Surgeon. Civil Engineer.

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streams suggest a ready imitation in our gardens or domains, the infinity of forms and shapes which the fluid may be made to assume would seem to open a wide field for artistical taste and display. As the most beautiful scenery in nature would be divested of its charms were it deprived of the water, which, in its tortuous course, or sudden and continuous gush, realizes to our eyes the height of beauty, so it would appear that as we do not avail ourselves of the agency of water, or if we do so, only to a trifling extent in the ornament of artificial parterres, we lose one of the brightest charms which might be imparted to them. With, from the improvement of hydraulic art, unlimited sources of supplies of water at our command, and a fluid capable of assuming any form in design to which art may direct its course, there is little doubt but that the neglect of Fountains has resulted from a want of knowledge of the principles upon which they should be constructed, and that when these are better known they will become an essential to every domain where beauty is the object or study of the garden architect. It is not alone, however, in country scenery that the use of Fountains is desirable. What would more relieve the monotony of the walk in crowded cities, and what prove more conducive to the cleansing, purification and cool-

falls of Aire, the Clyde, or Dunrobin; or the admired ones of the Isle of Wight, the beauty of whose picturesque would not be impaired by a mimic representation. The mountain torrent may be diminished in the fury of its course without losing the reality of the impression of the original. Phazes of scenery of great and varied beauty would present themselves, as the strata in the varied forms and structure of the rock, obeying the impulses of the rushing water, met the eye, whilst the descending water would afford a representation of the gentle mountain stream in its descent and progress to form the wide and expansive lake. Where ARTIFICIAL aids are required, these may be readily found in abundance in the imitation of nature, and more particularly of her vegetable products. Fancy may exhaust itself in its range from the drippings of water, from the close foliage of the tree to the rising shrub in its native exuberance and simplicity, which will suggest designs upon which the ready imagination may amplify at extent and pleasure. In this class we have the well-known and substantial tazza, the simple oak-leaf, or the copious-sized rafflesia, forming parts of the substantial execution of the decorative fountain, placed either individually or collectively. The most interesting, however, are what may pro-

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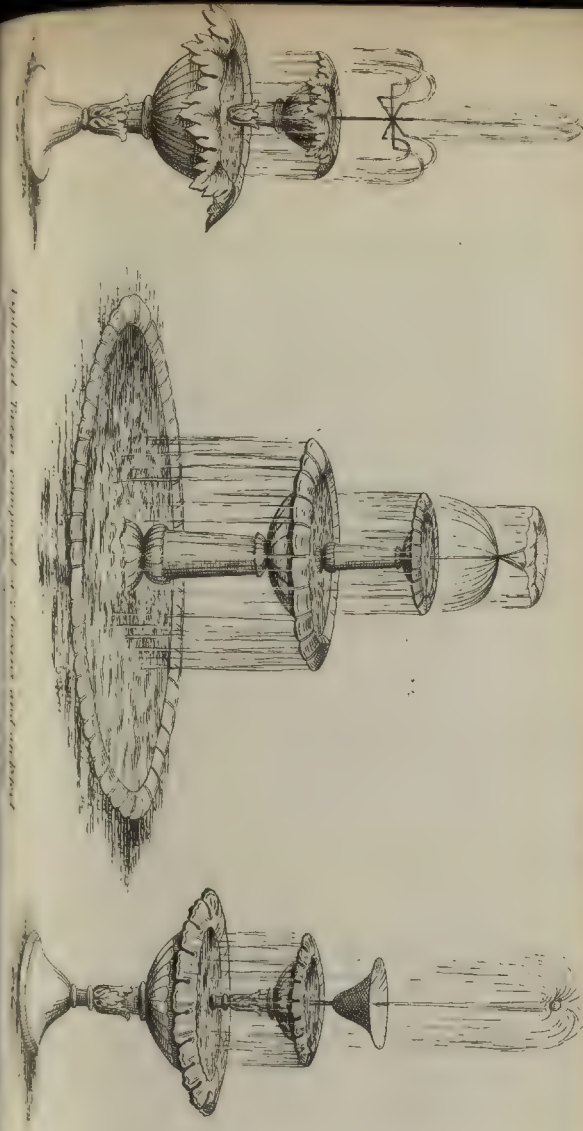
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The Fountain Pump is the most important improvement in the Art of raising water that has appeared within the last 2000 years the greatest
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Shaders has copied nature and arrived at perfection, it is an imitation of the Diaphragm.—*Surgeon Aberdour.*
This Pump is free from Friction and Leakage and is not liable to Choke.—*John Hey. Civil Engineer.*
This is the Pump.—*Professor Farington.*



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INVALID CHAIRS

who so much bewailed the death of her father, that she dissolved away into tears, forming the lake bearing the same name, would form an appropriate representation for the commencement of a water course. Amongst others, might be suggested Biblyss weeping herself to a fountain: Arion saved by dolphins, which the sweetness of his music had brought together; Amphitrite carried off by two dolphins; Arethusa turned into a fountain by Diana, and Criniseus into a river which could assume any course. In ARCHITECTURAL embellishments little has yet been done, although I shall give some designs of what may be rendered susceptible in this department of decorative Fountains.

Having entered thus fully, and I trust satisfactorily, into the subject of the utility and decoration of Fountains, I will now describe the conditions which are necessary for their construction; the mechanical details to which it is necessary to attend in their formation; and the composition of the materials employed in their structure. Fountains are dependant upon the laws of hydrostatics, that fluids will always find their level; but this theoretical view is not practically correct, from the impeding causes of the pressure and friction of the atmosphere, and the friction of the particles amongst themselves. To supply an

artificial Fountain we must, therefore, place it on the same conditions as our houses are supplied with water, the cistern or reservoir of supply being placed sufficiently high to bring it to its required elevation, overcoming the counteracting forces alluded to. In some cases, where the water-sheds lie high on adjacent hills, a sufficient head may be formed so that the natural fall of water will answer the purpose. This is the case with the magnificent Fountain recently erected by the Duke of Devonshire at Chatsworth,* who has shown as much liberality in its execution as magnanimity is displayed in its design. Although, to an extent previously unattempted and unknown in this country, it illustrates what may be done in ornamental art in Fountains, there is yet so much complication in the execution, by which so much expenditure has been incurred, which might have been avoided. In other cases, the head of water being placed out of sight, behind trees, or in some other situation in which it may be secluded from observation, may be supplied by the forcing pump. This may be worked either by horse or mechanical

* This, which is called the "Emperor's Fountain," in allusion to the Emperor of Russia, is the highest in the known world. The next in succession are those of the Emperor in Hesse Cassel; St. Cloud; Peterhoff in St. Petersburg; Old Chatsworth, and Versailles.

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power, or by manual labour; this of course depending on the quantity and duration of the required supply. In some cases, a steam engine may be made available for the purpose; and others, the common syphon brought into operation. Where, however, a small fall of water can be obtained, the hydraulic ram is the most advantageous instrument that can be employed, a perpetual supply is obtained at no trouble, cost of labour, and at very little expense.*

The mechanical details necessary to be attended to in the construction of Fountains, next come under our consideration. Having determined upon the form or varieties of the jet according to the design which has been selected, it must be noticed that whatever be its direction, the discharge of water will always be the same, provided that the adjutage or size of the jet, and the altitude of the water in the reservoir above it, be the same. This is a necessary consequence of the law of hydrostatics—the equal pressure of fluids in all directions. Water arising from a small jet or adjutage has sufficient velocity to carry it to the same height as the water stands in the reservoir, but it never entirely does so, being prevented attaining that height from various causes.

* A full description of this will be found in the appendix.

are desirous that each should attain its greatest possible attitude, the squares of the diameters of the conduit pipes must be to each other in the compound ratio of the squares of the diameters of the adjutages. Thus, if we know by experience the diameter that should be given to a conduit pipe to furnish water for the discharge of a given adjutage with a reservoir of a given altitude, we may determine the diameter of another pipe to feed a given adjutage with a reservoir of a given altitude. Care must also be taken that the conduit pipe increases in strength in proportion to the height of the reservoir.

On the subject of the material required in the construction of Fountains it will not be necessary for me much to enlarge. In the adaptation of pipes it will be necessary in some cases, and particularly where any portion is used for drinking or culinary purposes, to examine the quality of the water, in order to ascertain its saline impregnations. Where the water contains much carbonate of lime in solution, it is apt to incrust and stop up the pipe by its deposition, and whether lead or iron be used, carbonates are formed at the expense of the metal, the corrosive effects of which are more early visible in the destruction of the former. This has led to my giving a preference to the use of Glass pipes which I have

Having thus described all the leading causes to the formation of Fountains, the interesting task will now devolve upon me to point out those leading features of interest which above all other countries distinguish the gardens at Versailles, where mechanical skill and ingenuity has brought into play all the resources of hydraulic art and hydrostatic science. History informs us that the ancients held this ornament in high esteem, and that many of the Greek Cities were decorated with them. Pausanias informs us that Corinth was adorned with several; Frontinus is related to have superintended the erection of those at Rome, and the public Fountains which have been found in the excavations at Pompeii afford another instance of the former knowledge had of this particular art. The Fountains of Trevi, and the Pauline Fountains at San Pietro in Italy, remain distinguished for the massiveness and taste of their architecture; but it remained to our French neighbours to concentrate every thing gorgeous and magnificent, in which rigid simplicity is combined with the most refined classical taste, and where with but a small part of the mechanical resources which our own capital has at command the most surprising efforts of art have been accomplished. As many of my readers will doubtless visit (if they have not already done so) Versailles

celebrated for its ornamental gardens, the chief
part of the grandeur of which is owing to their
terraces, I shall proceed to describe them in
such a manner as that my observations shall form
a guide, which in explaining their mechanical
and architectural structure shall point out the
adaptation of their designs to our own native
taste. The following notice may therefore be

GUIDE TO THE FOUNTAINS OF VER-
SAILLES.

Were it not that it is no part of my plans to describe the magnificent building known as the chateau of Versailles, with the varied luxuries of its interior, the task would be unnecessary in account of the many excellent Guide Books which are to be met with on the subject. The fountains and water courses, are however, so connected with the gardens, that my task in describing the former, would be incomplete without some details of the latter, and I shall endeavour so to arrange my descriptions, that whilst they will aid the visitor, by pointing out the prominent objects in these walks, they will give to those who may not visit them, some idea of the pleasing imagery which they present, and enable them to adapt the designs so successfully introduced, to the do-

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 PROJECTOR & Co. PRINCES STREET, 10-11

INVALID CHAIRS

mestic scenery with which they are familiarize
We enter then the gardens by the large terrace
situate at the back of the chateau, known as the

PARTERRE D'EAU,

A name given to it 1674, because it was then
nearly covered with water. It now, however,
contains but two oblong basins, having various
groups in white marble dispersed round them,
the chief of which are flowers, river gods, nymphs,
cupids and children. The most striking performances
are perhaps a group of nymphs with lotuses,
and a zephyr; a nymph leaning on a vase, and
another on a Dolphin; whilst a series of allegorical
statues of the French rivers, executed by the
first artists, are thickly studded throughout. The
scene which here presents itself is strikingly picturesque.
Immediately before us lies the large
Allée, known as the tapis vert, or green carpet,
from its being a lawn of large dimensions; the
prospect being terminated by the Fountain of
Apollo, and the grand canal, and including the
basin of Latona with two beautiful parterres. On
the right hand we have in beautiful series, the
magnificent basin of Neptune, the piece of the
Dragon, the Allée de l'Eau, the Fountains of the
Pyramid, and the Parterre du Nord, whilst on the
left we have the Parterre des Fleurs, the orange
grove, and the vast piece of water called les Suisse.

the Parterre d'Eau we descend by a stair-
case of white marble to the southern portion of
the gardens, and enter the

PARTERRE DU NORD,

chief features of which are given by the
lawns and verdure. There are here three pieces
of water and six pieces of white marble. Thence
we proceed to the

BASSINE DE LA PYRAMIDE,

a jet d'Eau, forming, as its name
implies, a pyramid of great height, assuming the
form of a cone, from the manner in which the
water falls into successive cisterns. On the right
stand four statues, one of which is emblematical
of the sun. Retracing our steps we next arrive at

BASSINS DE DIANE.

Two baths of Diana, which are in the form of
semicircles, have a very pleasing and picturesque ef-
fect. In the centre there is a vast sheet of water
from which four jets d'Eaux proceeding from four immensely
grotesque heads. Three of the sides of the
baths are ornamented with dolphins, water
spouts, and groups of children, whilst on the
fourth side there is a bas relief, in gilded bronze,
representing Diana and her nymphs preparing for the bath.
At the two angles approaching the Allée d'Eau,

the Parterre d'Eau we descend by a stair-
case of white marble to the southern portion of
the gardens, and enter the

BANK PLACE, NORWICH.

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SHALDERS,

WM. SHALDERS, JUNR

EXHIBITOR,

PRINCE'S STREET, TOMBLAND, NORWICH

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THE CONNECTOR

fixing Rim or Flanch, blocked
powers or sizes each marked
stroke, being the largest size yet
largest size, it is practicable to
2240 lbs. of water each stroke
B. & W. each and every fine
inverting and retroverting fine

THE EXPRESS

the Fountain Pumps and Eng
Articles No. 24 & 25 each in
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they are cheap, simple and very durable and with common sense
they are cheap, simple and very durable and with common sense

had properties of other Hydraulic Machinery (which seldom admit an enu
retaining their good points, Fountain Pumps defy any valid objection being raised against them

retaining fluids for the general purposes of Life to all Lifts. They yield an immense saving of power with ceas
London Professor to be a Master Piece of Art, a Triumph of Science and a real benefit to Society at Large.

It is free from the liabilities and defects of the Friction Pump and approaches a perfect Hydraulic Machine.—Doctor Birbeck.
This Pump is free from Friction and Leakage and is not liable to Choke.—John Hey, Civil Engineer.

This is the Pump.—Professor Tarrington.

INVALID CHAIR

are two statues, one of which is crowned with grapes and playing on the flute, intended probably for Bacchus, whilst the second is simply a countenance expressive of rage, with a half-roaring Lion at the base. All the decorations are in admirable keeping with the *toute-ensemble* beauty of the bath. The next, we notice is the

ALLEE D'EAU,

Where are eight groups of statuary, supported by basins of Languedoc marble, from which proceed the jets d'Eaux. This beautiful parterre is separated into two walks of turf, on each of which four of these groups are placed. The execution and design of the statuary which also comprises eight other groups unconnected with the water is very interesting and striking. Two of the basins are supported by Tritons; two by groups of three beautiful children, one of whom is trying to catch the others within a wreath of flowers, and adorned with branches of grapes; two represent a young female and two cupids: whilst the remaining two represent three children, one of whom is dancing. Amongst the others more particularly in accordance with the scenery, are a young female and three children playing with fish; three children admiring the water which falls from a basin above their heads; and two females, one of which is

a partridge which the other has in posses-
We then proceed to the

BASSIN DU DRAGON,

from the centre of the basin there rises a
95 feet in height, from the mouth of
erpent Python, said to have been produced
the mud of the deluge, and killed by Apollo
in memory thereof instituted the Python

The head is surrounded by dolphins,
and with cupids with their bows, who are
to conceal their faces with their hands,
ashamed of being seen in such company.
as is the design and execution, however
into insignificance compared with the
object, the

BASSIN DE NEPTUNE,

when the fountains are in full play, pre-
a scene unrivalled in Europe. The number
d'eaux amounts to nearly one thousand
are dispersed so as to form objects of in-
erable variety and beauty. There are on
orth side of the basin twenty two immense
rises, throwing up jets of water to a great
which falls into the canal, and all orna-
with appropriate bas reliefs. There are
three of these jets of which in two-thirds

the last 2000 years the greatest

Doctor Birkbeck.

the Art of raising water that has appeared within the last 2000 years the greatest

perfect Hydraulic Machine.—*Doctor Birkbeck.*

approaches a perfect Hydraulic Machine.—*Doctor Birkbeck.*

imitation of the Diaphragm.—*Surgeon Abernethy.*

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streams of water issue from the sides, whilst from the canal rise twenty-three jets of water corresponding with those rising pyramidically from their vases, and on all sides sea monsters are darting jets of water at each other horizontally. The chief group, and that which gives the name and design to this Fountain, is that of Neptune and Amphitrite, with their numerous attendants consisting of tritons, sea nymphs, and a variety of marine monsters. Neptune himself is seated on a nautilus, and behind him is a monster of the largest dimensions, from whose leaden jaws flows a whole river of water. Other groups represent Proteus, Oceanus, and Dragons of various forms, bestudded with Cupids, and presented to be conquered by love, from all of which issue streams of water, or jet d'Eaux, are executed in every variety of form and direction. Various other groups of statuary are dispersed, giving to the whole a *tout-ensemble* of the most interesting, varied, and imposing character. Passing other parterres, not decorated with Fountains, we arrive at the

BOSQUET DU ROND VERT,

A pretty grove, containing a small piece of water at its western angle, in the centre of which is a small island, upon which there is a group of

CONFERENCE

THE Rim or Flanch, block
fixing or sizes each marked
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stroke, being the largest size y
largest size, it is practicable to
2240 lbs. of water each stroke
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THE EXPRESS
the Fountain Pumps and Em-
Articles No. 24 & 25 each in
material, still giving far super-

THE ROD Rods, in-
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all, the economically than by any other Cylinder Pumps, and by the fact that they are cheap, simple and have the properties of other pumps, but their good points.

The Fountain Pump is

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It is free from the lian
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This is the Pump.---P

INVALID

INVALID CHAIRS

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EXHIBITOR,
WM. SHARPE
TOMBLAND, NORWICH

EXHIBITION,
This Pump is the *Professor* Pump.
This is the Pump.
— PRINCES STREET, TOMBLAND, ROSS.

by groups of smiling children. On this spot, in 1667, there was erected a temporary *salle de souper*, the most prominent object of which was the famous rock, having on its top the celebrated horse Pegasus, which, as it pranced by the means of mechanical power, threw out jets of water, which falling in abundance, formed four cascades. At the same time, small streams of water flowed from all the crevices of the rock, which, spreading themselves over the surface, covered it with spray. The

BASSIN DE L'OBELISQUE,

is a very curious Fountain, although it is rarely put in operation, owing to the great expense attendant upon it. There are no less than two hundred and twenty-one leaden pipes at the bottom of a semicircular basin, projecting innumerable jets of water in the form of a sheaf, whilst others rise to the height of eighty-four feet, exhibiting the appearance of a pyramid or obelisk. The waters falling in cascades upon the steps, return to the channel round the basin from which they originally proceeded. The next at which we arrive is the magnificent

BASSIN D'ENCELADE,

taking its name from one of the giants struck by

SHAL

THE CONNECTOR
 affixing Rim of Flanch, blocked
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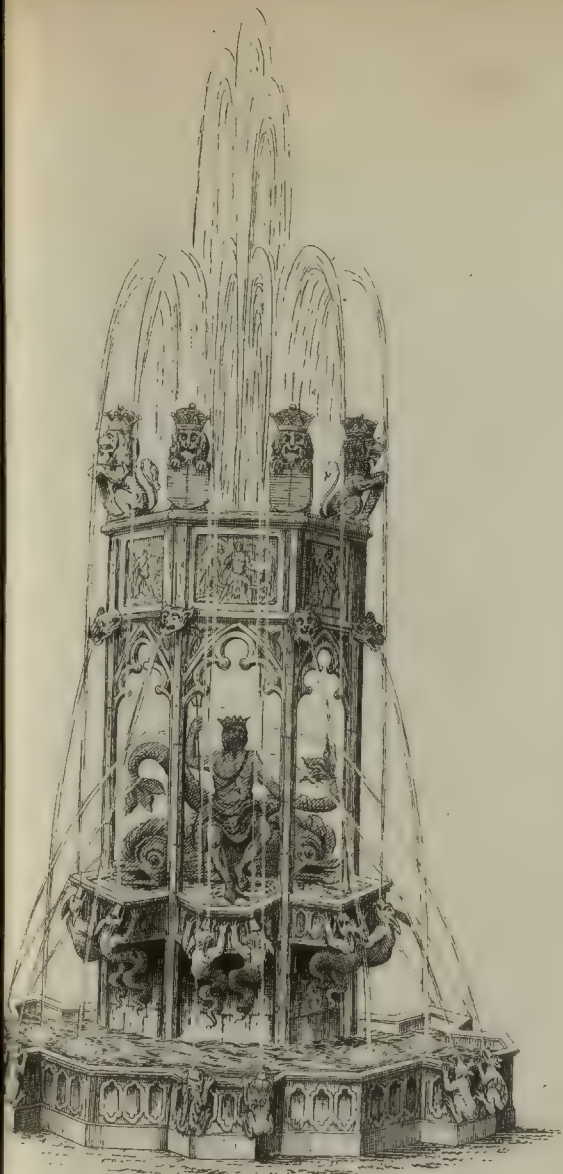
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 This Pump is free from Friction
 This is the Pump.—*Professor*

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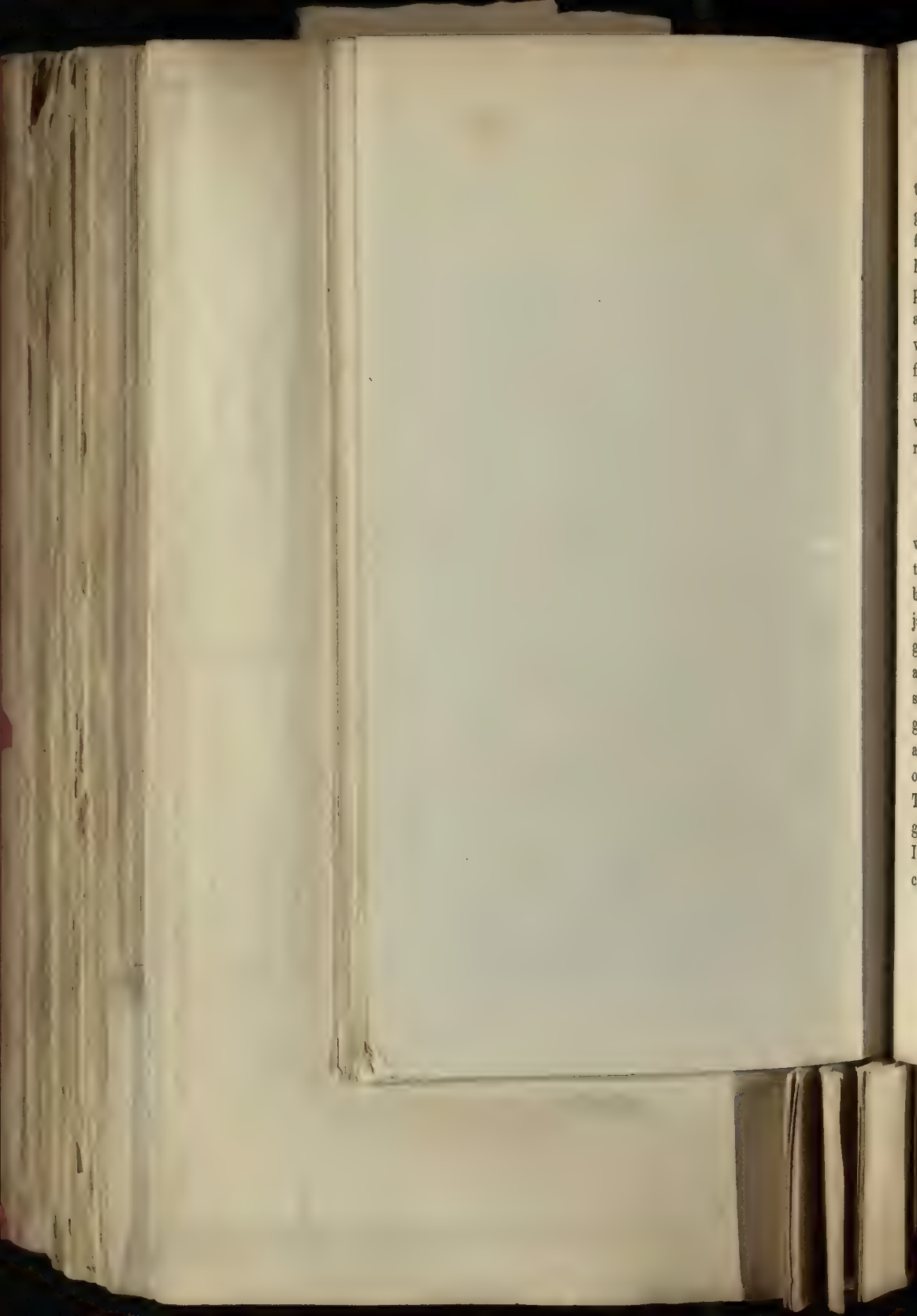
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CONFECTION

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BASSIN D'APOLLON.

which is inferior only in effect to those of Neptune and Latona. In the group, Apollo, attended by dolphins and tritons, blowing from their huge bows vast jets of water to all parts of the compass, guiding his four spirited coursers from his car, and rising out of the immense mass of water which surround him on all sides. The effects of the group are only to be seen when the Fountains are at play, and are destroyed by the quiescence of the water when the marble of the basin appears. The Fountain is surrounded by several statues and groups of sculpture, containing a figure of an Indian in the act of serpent-charming; Orpheus charming Cerberus; Silenus crowned with the

[illegible]

they are creators of other **Fountain Pumps** all Latis. **Doctor Birkbeck.**
 had properties of Life to all Latis. **Doctor Birkbeck.**
 and purposes of a 'Triumph of raising water that has appeared with

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London Professor of the most important times. — *Mechanic's* — *Diaphragm*. — *Surgeon*.
 The Friction Pump is the most important times. — *Mechanic's* — *Diaphragm*. — *Surgeon*.
 The Friction Pump is the most important times. — *Mechanic's* — *Diaphragm*. — *Surgeon*.

The Foundation in novel and useful Arts and detects of the Choke. — John

It is free from Friction and Leakage and
Shalders has copied from Friction.
free from Friction.
Dartington.

EXHIBITION,
This Pump is now on exhibition at the
Pump, -- Professor Tarnish's
is the Pump.

Handwritten:
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INVALID CHAIRS.

vine and caressing the infant Bacchus, &c. In the centre of the

BOSQUE DES DOMES,

in the middle of a balustrade of marble, surrounded by forty-four bas-reliefs representing the arms of various European nations, is a large cistern, from which a jet d'eau is elevated to the height of seventy feet. The statuary judiciously distributed about the ground, particularly at the back of a row of elm-trees, include, a nymph of Diana carrying a net and caressing a timid hare; Amphitrite carried off to sea by means of two dolphins; two Cupids playing with a dolphin; Hercules holding in his arms the youthful Hylas, &c.

We now leave this part of the grounds, and ascend a flight of steps to the two alleys which are divided by the Basin of Latona, undoubtedly the most splendid of all the Fountains of Versailles. Passing some beautiful groups, we arrive at the

FONTAINE DE DIANE,

the Fountains of which form a sheaf, rising to the height of twenty-five feet in the middle of the basin, and falling back again into the interior of the channel. In an adjacent basin is a representation of lions having vanquished a wild boar

able height, upon which are placed figures of Latona with her two children, Apollo and Diana. This is designed from the beautiful allegory of Latona imploring the vengeance of Jupiter against the peasants of Lysia, who had disturbed the waters wherein she was wont to quench her thirst. The execution of the work shows that the prayer has been granted, and the accomplishment of the dreadful punishment. In all directions, on the steps as well as on the borders of the water, men and women are seen metamorphosed into frogs, throwing jets of water out of their mouths, directed towards the goddess and her children. When the waters are at play, their effects are most imposing, whilst the beautiful parterres and distant prospects complete a most delightful scene. Passing through the Tapis by the Orangery, we arrive at the

SALLE DE LA COLONNADE,

a circular building, the peristyle of which is formed by thirty-two columns of Languedoc marble, crowned by a rich Corinthian cornice, with an attie, bearing thirty-two vases of white marble, terminated with pine apples. Between the columns are arcades, ornamented by figures of nymphs, naiades, and sylvan gods, under which are twenty-eight cisterns of white marble, from

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THE CONNECTOR

fastening or sizes each marked N powers, being the largest size yet stroke, it is practicable to largest size, it is practicable to 9240 lbs. of water each foot in B. & W. each and every foot inverting and retroverting friction

THE EXPRESS

the Fountain Pumps and Eng Articles No. 24 & 25 each in material, still giving far super

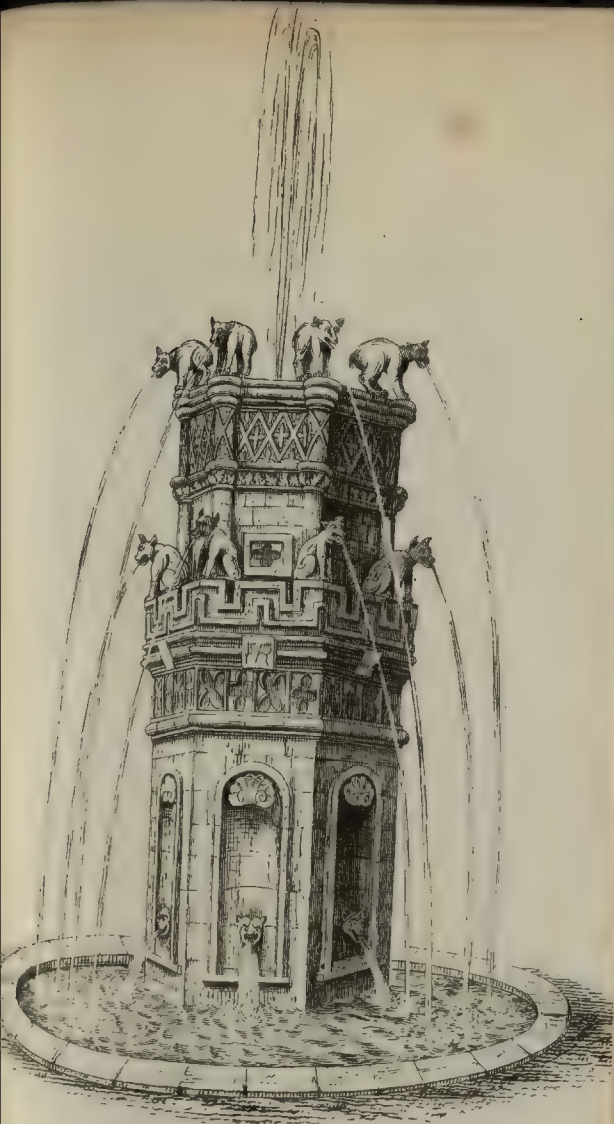
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EXHIBITOR, WM. SHALDERS, JUNR
BANK PLACE, NORWICH
PRINCES STREET, TOMBLAND, NORWICH

INVALID CHAIR

each of which a jet d'eau proceeds, the water falling in cascades into the inferior channel. At the back of a row of elm-trees, and near the Basin of Apollo, are some appropriate statues amongst which are Ino precipitating herself into the sea with her son; Spring represented under the form of the goddess Flora crowned with flowers: the god Pan with his flute. In the Salle des Empereurs is a semi-circular basin, called des Dames Romaines, and adjacent is the *Bassin de la Muse*, so called from a figure of one of the Muses before it. Traversing now the Allée de l'Hiver, we enter the beautiful

JARDIN DU ROI,

which was completed during the reign of Louis the Eighteenth. In the centre of the Bosquet is a fine piece of water, called "the Mirror," on the right of which are two vases and four statues, one of the former being Venus coming from the bath. Adjacent is the *Bassin de l'Hiver*, of a circular form, containing a lesser one in the centre, and decorated with a group representing Saturn, or Winter, chafing his hands, whilst several children are occupied in kindling a fire. Passing the *Quinconce du Midi*, we enter the octagonal

each of which a jet d'eau proceeds, the water falling in cascades into the inferior channel. At the back of a row of elm-trees, and near the Basin of Apollo, are some appropriate statues amongst which are Ino precipitating herself into the sea with her son; Spring represented under the form of the goddess Flora crowned with flowers: the god Pan with his flute. In the Salle des Empereurs is a semi-circular basin, called des Dames Romaines, and adjacent is the *Bassin de la Muse*, so called from a figure of one of the Muses before it. Traversing now the Allée de l'Hiver, we enter the beautiful

NOEWICH.

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WM. SHALDERS,

EXHIBITOR,

PRINCES STREET, TOMELAND, NOEWICH.

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THE CONNECTOR

affixing Rim or Flanch, blocked powers or sizes each marked stroke, being the largest size to largest size, it is practicable to 2240 lbs. of water each stroke B. & W. each and every foot inverting and retroverting fire

THE EXPRESS

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THE MERITS

Rolling Action, which is without blocking up the of the Connector quickly all, they will pump up economically than by any Cylinder Pumps, and by their admitting or with common

the Fountain Pump is the most important improvement in the art of raising water that has appeared within the last 2000 years the greatest saving of power will be obtained by their admitting or with common

It is free from the liabilities and defects of perfection, it is an imitation of the Diaphragm. Surgeon Aberdour. John Hay. Civil Engineer.

INVALID CHAIR

BASSIN DE BACCHUS,

or of Autumn, in the middle of which is a group representing Bacchus crowned with vine-leaves, and surrounded by little satyrs. Hence we enter the

SALLE DE BAL,

which has been the scene of many a gay assemblage, the last of which was the celebration of the marriage of Louis the Eighteenth with Marie Josephine Louise, of Savoy, in May, 1771. On ordinary occasions, it displays only pebbles and shells for a grotto, with candelabræ and bas-reliefs. When the Fountains are at play the scene is very imposing, and in former times, whilst in operation, the chandeliers were filled with lights, whilst thousands of odoriferous plants and flowers were placed round, emitting their perfumes. We now notice the

BOSQUET DE LA REINE,

a favorite spot for the evening walks of the unfortunate Marie Antionette, which suggested to Madame de la Motte the ingenious scheme of the Diamond Necklace, an abstract of which tale being not uninteresting, may be found in the Appendix. Near the Orangery, we approach the

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WM. SHARP
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W. H. & Co. PRINCE

INVALID CHAIRS

which is a weeping willow planted by her hands. The gardens, which are filled with the most rare exotics and flowers, were intended by Louis the Fifteenth as botanical gardens, for which purpose they were laid out by Jussien.

Having conducted my readers through every object of interest connected with the Fountains, basins, and ornamental waters of the ornamental grounds of Versailles, I shall complete my task by merely naming their great source of supply. These are the grand Reservoir at the end of the Allé du Nord; the Piece d'Eau des Suisses, and the Château d'Eau in the city of Versailles, from whence pass innumerable conduits, pipes, and aqueducts, intersecting each other in every direction, and all concealed from the sight. The water is from thence forced by engines to the required heights above its natural level. The lesser Fountains play every Sunday, from the first of May, during the summer, but the larger only on particular occasions, as fête-days, when they play for no longer a period than four or five hours successively, and always in the following order:—the Baths of Apollo, the Basin of Latona, the Salon de Bal, the Colonnade, the Basin of Apollo, the Jet of the Domes, the Giant Encelade, the Obelisk, the Allée d'Eau, and the piece of Neptune.

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would form an interesting appendage to the terminus of a grove, whilst the beautiful imagery of Moses striking the rock would be very suitable at the end of a parterre leading to the sanctuary of village worship. A perusal of the foregoing pages, in the suggestions of what may be done, and a description of what has been accomplished, however, renders any further observations on this subject supererogatory. The adaptation of Fountains to position or scenery, requires in fact no new rule of taste, as they suggest themselves to the least imaginative mind. Ideas may, it is true, revel in poetic imagery, but it must be borne in mind that simplicity is the characteristic alike of nature's works and classic taste.

I cannot conclude without briefly alluding to the subject of hydraulic embellishments. With a fluid capable of taking all the varied forms which fire is capable of assuming in Pyrotechnical displays, much good effect may be accomplished. The horse Pegasus, snorting in its majestic grandeur, is stated to have realized some of the most interesting beauties in famed Versailles, and thus the reality of life may be added to the still quiet of nature. Mechanical effects may easily be produced by the means of hydraulic power, and the fluid used in the decorative can readily be made to produce the required design in execution.

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Doctor Birbeck.

perfect Hydraulic Machine.—*Surgeon Aberdow.*

imitation of the Diaphragm.—*John Hay, Civil Engineer.*

Choke.—*John Hay, Civil Engineer.*

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In conclusion, I trust that the object of the present work will be accomplished, by simply drawing attention to the subject. It has merely been my aim to point out the desirableness of extending the employment of Fountains, and the means by which this may be accomplished. I have illustrated this by the far-famed Fountains of Versailles, and I now leave the subject in the hands of my readers, apologizing for any deficiency which my present undertaking may contain.

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APPENDIX.

DESCRIPTION OF AN IMPROVED HYDRAULIC RAM.

Since the original introduction of the Hydraulic Ram, by M. Montgolfier, many suggestions for its improvement have been made and adopted. The first essential improvement was that made by his son, and secured by patent in this country. The operation in the latter was much more effective, amounting to no less than eighty-four per cent, whilst the length of the tube was much shorter than in the former machine. These improvements consisted in the addition of a small shifting valve, which serves to introduce a quantity of air into the head of the Ram at each movement or elevation of the water, from whence it is driven by the next movement into the air-vessel, which would otherwise become filled with water under a high pressure. In the interior of the head of the Ram likewise is an annular space surrounding the frame of the stop valve, contain

ing a small volume of air, which cannot be forced into the air vessel, but which at the first instant is compressed by, and receives the effort of, the moving water. This is called the air matress, and by means of the stop valve is shut with less noise, the pipe having a diminished strain thrown upon it, and all the operations taking place with so much ease, that the machine is less exposed to be shaken and put out of repair.

Another important change in the construction of the Ram is, that the end of the pipe or body which receives the water of the reservoir is formed like a trumpet mouth, so that the water may flow more readily into the pipe, the length of such being regulated according to the height of the fall of water which is to produce the current. The pipe is composed of several lengths, screwed together by flanches, or other similar means; but it is in the end piece, which is called the head of the Ram, that the moving parts of the machine are placed. The extremity of the pipe, or head of the Ram, is a hollow sphere, the diameter of which is nearly twice as great as the bore of this pipe. The upper part of the spherical end is flattened, so as to reduce it to the segment of a sphere with a flat circular surface on the top or upper side, in the centre of which surface is a large circular opening to receive and hold the

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Doctor Birbeck.

a perfect Hydraulic Machine.—*Surgeon Aberdour.*

it is an imitation of the Diaphragm.—*Civil Engineer.*

Choke.—*John Hay.*

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It is free from the liabilities and defects of the Friction Pump and approaches a perfect Hydraulic Machine.—*Surgeon Aberdour.*

This Pump is free from Friction and Leakage and is not liable to Choke.—*John Hay.*

INVALID CHAIR

seat of the stop valves at which the water issues, but when the valve is closed, it prevents the water from issuing.

By this arrangement, the mechanical details of which are so ingeniously contrived as to accomplish the required object, when the valve opens, the water descends perpendicularly into the hollow sphere, leaving a free passage through the opening. The valve is guided between three or four perpendicular stems, which have hooks formed at the lower end, by which the valve is supported when opened. These stems are fixed by screws, so that they can be regulated to allow the valve to descend more or less, and open a large or smaller passage. The valve is hollow, having a flat circular plate of metal, with a hollow cup or dish of the same material attached to its lower surface. This renders the valve lighter in the water, giving it a convex surface on the lower side, which when opened corresponds in curvature with the inferior concave surface of the spherical end of the head of the Ram. The seat of the valve is composed of a short cylinder or pipe, the opening of which is much greater than the transverse section of the body of the Ram, whilst the short cylinder is screwed by its flanch into the opening in the upper surface of the head. The flanch of the seat is so formed as to have an in-

verted cap round the upper part of the short cylinder, forming a circular channel or annular space without the head of the Ram, which will contain air, and from which the latter cannot escape when compressed by the water. The air in this channel is called the matráss, and the shifting valve is at the end of a small pipe which leads from the annular space or matráss to the open air. The shifting valve opens inwards, in order to admit the air to enter into the matráss, and to prevent its return there is another small valve in the same pipe which opens outwards, whose object is to admit a certain quantity of air into the matráss, and then to shut and prevent any further entrance.

On the outside of the seat of the stop valve, or over the aperture in the head of the Ram where the water issues, another stop valve is applied, similar to the internal valve before referred to, which shuts down on the outside of the seat. The upper part of the pipe or head of the Ram, is made flat at the part near the end, where it enlarges to a sphere, and this flat surface on the top of the pipe has several narrow openings across it, which are covered by as many flap valves of leather, in order to allow water to pass out through the main pipe, and prevent its return. On each side of the head of the Ram, at the part

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Civil Engineer.

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This is the Pump.—*Professor Partington.*

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INVALID CHAIR

opposite these flap valves, is a hollow enlargement in the form of a segment of a horizontal circle and the two enlargements taken together form a circular basin, through the centre of which the pipe of the Ram passes. This circular basin is covered by a cylindrical air-vessel, screwed down by the means of a flanch at the edge, so that it forms the bottom of this space. In consequence of this arrangement, all the water which issues from the body of the Ram through the flap valve will flow off on each side and be received in the basin. As, however, the circular basin, or bottom of the air-vessel, is divided into two parts by the pipe of the Ram which passes it, there is a passage communicating from one of the enlargements to the other, for which purpose it curves down and descends beneath the pipe of the Ram. The ascending pipe that carries away the water which the machine raises, proceeds either from this curved passage or some other part of the basin, so that it may receive the water which has passed from the body of the Ram through the flap valves and the air-vessels into the basin on each side of the pipe.

This is a fair description of the Ram invented by Montgolfier, and improved upon by his son. I will now give, in as simple a manner as possible, a description of the machine as fixed by myself.

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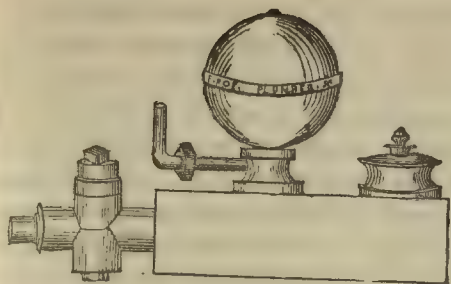
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In order to bring the Ram into operation, it is necessary that there should be a head or body of water, such as a pond or running stream, from whence a fall may be obtained. The Ram itself is composed of a square box, say fourteen inches by three and a half inches square, one of which is attached to the pipe leading from the head of water, at the other end being a valve called the pulse valve. On the top, or about the centre of this box, an air-vessel is fixed. Between the square box and the air-vessel there is a valve, as well as another in the neck of the air-vessel for supplying the air-vessel with fresh air. The Ram being ready for action, the water descends, being let down through the pipe, which causes the pulse valve to close. The sudden close of the latter causes the water to retreat back again for a short space, which again permits the opening of the

of the pump effect. In all, they will pump up more economically than by any other means. Drums, and by their admirable and very durable and strong construction, being raised against their own weight, they will pump up more economically than by any other means. Drums, and by their admirable and very durable and strong construction, being raised against their own weight, they will pump up more economically than by any other means.

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This Pump.—*Professor.*
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pulse valve by the pressure of the atmosphere upon it. The water returning, causes it again to close; it again retreats, and this constant motion causes the action of the Ram. At each pulsation a small portion of water is admitted into the air-vessel. The air being compressed in the air-vessel by the admission of water, drives the latter up through a small pipe attached to the air-vessel to a height of one hundred, one hundred and fifty, or even three hundred feet, according to the fall that can be obtained.

THE DIAMOND NECKLACE.

"In the time of Marie Antoinette, and just prior to the breaking out of the French Revolution, the attention of France, and in fact of all Europe, was drawn to the famous affair of the Diamond Necklace. The heroine of the scene was Madame the Countess de la Motte, who obtained for her dupe the celebrated Cardinal de Rohan, who had unhappily fallen into disgrace with Her Majesty. Two jewellers of Paris were in possession of a Diamond Necklace of immense value, which had formerly belonged to the Countess du Barri, and who offered it for purchase to their Majesties, by whom it was, however, declined with the statement "they stood much more in need of a ship of the line than a Diamond Necklace." The cupidity of Madame de la Motte, however, being awakened, she determined to become the possessor, to accomplish which she set to work in a very subtle manner. She first sounded the feelings of the Cardinal, by borrowing of him the respective sums of sixty and a hundred thousand livres on behalf of Her Majesty. Satisfied with the result of these experiments, she next informed him that the Queen had commissioned him to buy the Diamond Necklace, as although she desired its possession, she

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 Shaders is free from Friction and Leakage and is not liable to Choke. — *John Hay. Civil Engineer.*
 This Pump is free from Friction and Leakage and is not liable to Choke. — *John Hay. Civil Engineer.*
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did not wish to appear as the purchaser. To confirm the Cardinal, she obtained a Mademoiselle le Guai, a young nymph of great wit and beauty, to personate the unfortunate Queen, without, however, imparting to her the secret of the deception. Her task was to wait at eleven in the evening in the walk, to give a rose to the person who should accost her, and to say, "*you know the meaning of this, the past is forgotten.*" The task was fulfilled to the letter, and the Cardinal at once negotiated with the Jeweller, for the sale of the Necklace, which was in a few days in the possession of Madame de la Motte, who returned an agreement with the pretended signature of "Marie Antoinette." The Necklace, so long the object of their wishes, was soon taken to pieces and disposed of, and to lull suspicion, the first instalment of thirty thousand livres in the assumed agreement was duly paid. The second, however, not being so punctually paid, the jewellers memorialized the King, who at once detected the fraud. The Count de la Motte sought safety by flight to England, but the Countess was arrested, who with the duplicity that was common to her whole career, sought to throw the onus of the transaction upon the Cardinal de Rohan, and Count Cagliostro. On trial, however, these were honorably acquitted; Mademoiselle de Guai,

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the personator of the Queen, was, from her presumed credulity, set at liberty; the Count de la Motte was condemned, in case he should be imprudent enough to let himself be taken, to be branded with the *fleurs de lys* on both shoulders, and after being soundly whipped, sentenced to the galleys for life; and his wife, who was convicted of the theft, and all the odious machinations connected with it, was whipped and branded, and sentenced to be confined for the rest of her days, in a house of correction. After undergoing the severer portion of her sentence, she, however, effected her escape from prison, and eventually joined her husband in England.

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Arti- cles, No.	Powers No.	Weight of water dischd. pr stroke lbs. ozs. Inches.		
1	21	10	4	12
2	21	10	1	10
3	20	14	1	15
4	20	14	2	6
5	20	14	3	10
6	20	14	6	10
7	18	1 14	2	10
8	18	1 14	5	10
9	18	1 14	4	15
11	16	3	6	0
12	16	3	10	0
13	16	3	8	3
14	14	5½	8	10
17	14	5½	12	0
18	12	9	13	10
19	12	9	9	10
20	10	12½	16	10
21	10	12½	8	7
24	21 to 5	10, 48	1	5
25	21 to 5	10, 48	8	7
26	22-0z.	7 to 1170	9	9
27			16	10
28			8	7
29			5	5
30			1	10
31			5	0
32				

The Fountain Pumps, Engines, Hydraulic working parts, &c. &c. sent by W. S. Junr. as above are a portion of regular Sale Stock, and are each Fac
similes, of some of the leading varieties of real and indisputably proved practical adaptations of his Father's Patent, as designed, Manufactured and
applied by Wm. Shalders, Junr.

THE CONNECTOR the main feature in this Hydraulic or Pneumatic machine as per samples sent in 1850, is a most generally used and external
affixing Rim or Flange, blocked into shape from a flat Disc of suitably prepared leather as per samples sent in 1850, the weight of water per
power or sizes each marked No. 26 from 3 inches up to 40 inches diameter, giving a discharge varying from 7 oz. up to 1150 lbs. weight of water per
stroke, being the largest size yet made, but W. S. Junr. graduated working scale extend to a working Cone Barrel 60 inches diameter, which is about the
largest size, it is practicable to procure a suitable Neats Hide of Leather to block a Connector from without a seam, which size will deliver a Ton weight
of water each stroke or dip of 36 inches, and will admit of making at moderate speed 30 strokes per minute, requiring only Two Horse Power,
B. & W. each and every foot in height the water is raised. This Connector or Diaphragm or Midriff is supported through its entire water or air-tight
inverting and retroverting frictionless evolutions by the passive Cone Barrel in which it works and by the active Cone of the Expresser.

THE EXPRESSERS OR MOVING BUCKETS. and also the BOTTOM OR FIXED VALVES AND VALVE SEATS in all
the Fountain Pumps and Engines sent for true economy's sake, are made in Brass, Copper, or a superior Composition Metal as per sample specimens,
Articles No. 24 & 25 each in seven sizes; for temporary economy, these Hydraulic working parts admit of being made in Wood, Iron or other cheap
material, still giving far superior water passage ways, compared with the best made Common Pump Buckets.

THE ROD BRACE as per specimens, Articles No. 27, in three sizes for ½ inch ¾ inch and 1 inch Copper (or other uninjurious to Leather)
Metal Actuating Rods, invented by W. S. Jr. to supercede the enormous friction of the Common Tow and Tallow packed Stuffing Box, this simple and
most efficacious contrivance complete all the Hydraulic working parts usually necessary and render an Engine or Lift Fountain Pump as effective, as one
having an open Access to the Expresser or moving Bucket.

THE MERITS OF THESE NE PLUS ULTRA HYDRAULIC OR PNEUMATIC MACHINES consist in their Reciprocating and
Rolling Action, which is effected without Leakage, Friction, or liability of Choking from such particles as are not easily prevented from entering
without blocking up the entrance to their Suction Pipes, as small stones, shingle &c. or from Cargoes of Grain, Pepper, Rice, Beans &c. the evolutions
of the Connector quickly expelling such matters, without receiving material injury, but which with the Valve Leathers are the only parts that suffer at
all, they will pump up even from the bottom of deep wells and drive up to a higher level, any puddled soil or half sand and half water, and that more
economically than by any other known means. Fountain Pumps admit of more economical and simpler construction than the common Piston and
Cylinder Pumps, and by their admitting of either quick or slow motion without Leakage or loss of Power, they are easily applied to any motive force,
they are cheap, simple and very durable and with common Smith's Tools, the most complex are readily examined or repaired. Thus by avoiding the
bad properties of other Hydraulic Machinery (which seldom admit an effect to be produced equivalent to more than half the power expended) whilst
retaining their good points, Fountain Pumps defy any valid objection being raised against their general adoption to raise and convey water or other unin-
jurious fluids for the general purposes of Life to all Lands. They yield an immense saving of power with certain effect and are pronounced by a Learned
London Professor to be a Master Piece of Art, a Triumph of Science and a real benefit to Society at Large.

The Fountain Pump is the most important improvement in the Art of raising water that has appeared within the last 2000 years the greatest advance-
ment in the useful Arts in modern times.—*Mechanic's Institution.*
It is free from the liabilities and defects of the Friction Pump and approaches a perfect Hydraulic Machine.—*Doctor Birkbeck.*
Shalders has copied nature and arrived at perfection, it is an imitation of the Diaphragm.—*Surgeon Aberdour.*
This Pump is free from Friction and Leakage and is not liable to Choke.—*John Hay. Civil Engineer.*
This is the Pump.—*Professor Partington.*

EXHIBITOR, WM. SHALDERS, JUNR BANK PLACE, NORWICH.
PRINCES STREET, TOMBLAND, NORWICH

THE UNITED STATES OF AMERICA

DEPARTMENT OF THE INTERIOR

Geological Survey and Geological Survey

Washington, D.C.

REPORT OF THE

Geological Survey

Geological Survey

Geological Survey

Geological Survey

Geological Survey

Geological Survey

Geological Survey

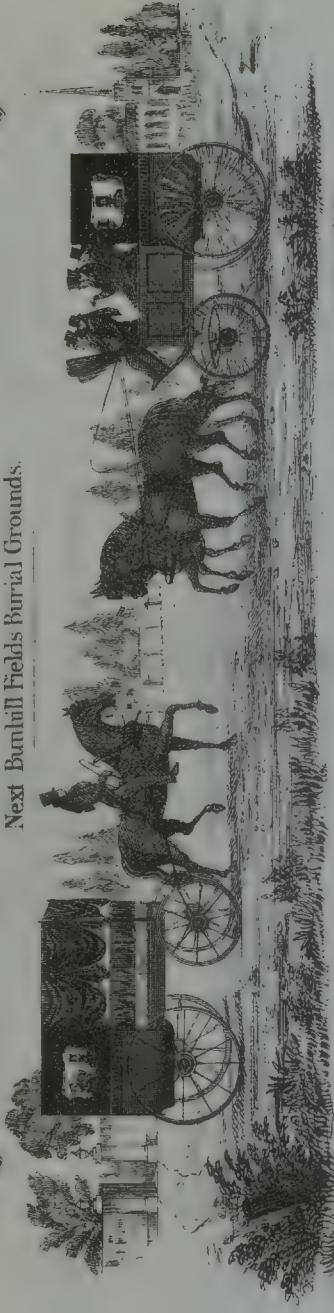
Geological Survey

COMBINING HEAVY & COACH IN ONE VEHICLE



PATENT FUNERAL CARRIAGES,
COMBINING HEARSE & COACH IN ONE VEHICLE
CITY ROAD, FINSBURY, LONDON.

Next Bunhill Fields Burial Grounds.



SINGLE HORSE FUNERAL

RETURNING FROM THE CEMETERY



FOUR HORSE FUNERAL

The Patent Funeral Carriage, embracing a principle of economy to put the means of all Classes will enable the Public generally, to abolish the expensive necessity, under the present system, of employing at least two Carriages, viz: a Hearse and a Mourning Coach.

These improved Vehicles combine, in one Carriage, the necessary Funeral carriage of a Hearse and Mourning Coach, forming, on the return from the Cemetery, a Mourning Coach only. The Hearse part being so constructed as to contract and form seats for the Undertaker & attendants to ride back. — The inconvenience of Walking Funerals which is severely felt, especially in wet and cold weather, may be entirely abolished by the adoption of these Patent Carriages, inasmuch as a Carriage with one Horse can be supplied to carry the Body and Six Mourners, at a charge less than that incurred by the present mode of Bearers and consequently the ordinary necessity for Funerals walking through the Public Streets to the Burial Ground, subject to the gaze of the passing multitude, and to the inclemency of the seasons will be removed, and the feelings of the Mourners better consulted. — These elegant Carriages are peculiarly adapted for the Interment of Children, by avoiding the offensive, unsightly & unpleasant appearance of the Hearse part rendering it suitable for any age, from the Child to the Adult and totally distinct from the part in which the Mourners ride."

EXTRACT FROM THE MORNING CHRONICLE.

"Improvement in its march pursues us to the very grave. The Patent Funeral Carriage is an ingenious contrivance, to mitigate the cost of human burial and facilitate the progress to the tomb. It unites in one carriage, a Hearse and Mourning Coach, returning to the last the proximity between the living and the dead, and making them therein affording a practical illustration of a constantly recurring figure of speech, fellow travellers to the final resting place of all things mortal. It must be owned that the invention is one of great merit, it takes little from the pomp, and nothing from the decency of the customary funeral obsequies. Its construction is light and not inelegant. It is capable of decoration in the same fashion as the more ponderous Hearse of the present day, whilst in facility of motion, and compactness of form, it is infinitely its superior. Its office of bearing the dead completed is lost as once the semblance of a Hearse and becomes a convenient carriage for the convenience of the attendants as well as the Mourners from the sorrowful scene of Interment. In addition to these advantages, it has the merit of being cheap, so that there can be little doubt of its rapidly passing into general use."

City Road,
near Finsbury Square,
London.

Sir,

I take the liberty of drawing your attention to the annexed sketches and description of my Patent Funeral Carriage for the conveyance of the deceased and my Mourners totally distinct but in one Vehicle, now so successfully established and extensively patronized by bereaved Families in the Districts set forth on the other side, with a view to its introduction into your neighbourhood, where an economic Funeral conveyance is much required, as any person keeping one or more Horses, whether Undertaker, Farmer, Innkeeper, or Draper, would find it a very safe and advantageous outlay of Capital. — Whenever a Hearse or Mourning Coaches are kept, my Patent Funeral Carriage is applicable, and it is found most desirable, to prevent any competition, to grant purchasers the exclusive Licence to use my Patent right for a District, at a small annual consideration governed by the population, by which a property is created, and thereby protected.

The price of a new Carriage all complete, with Patent Wires, Pole and Strafts, for one or two Horses, and Velvet Canopy for Adult or Child, is £150.

In the hands of Funeral Furnishing Drapers the Patent Carriage is found by many large Drapers of the highest respectability who have purchased & established them in their several Districts, not only to materially increase their Funeral Business by the elegant appearance of the Carriage, but to add very considerably to their Drapery Trade by inducing the purchase of Mourning Goods.

It is necessary to state, that these Carriages do not so much interfere with the old style Hearse & Coaches principally used by the higher orders as might be supposed, but they create a new system of Funeral, which, by the economic principle of adaptation to 1, 2, or 4 Horses, enables all classes to employ them, and consequently materially increases the Funeral Carriage Trade of any City, Town, or District. — for any Concern introducing it, a greater share of Funeral Business in any populated District.

I remain, Sir,

Your most obedient Servant,

Geo. Shillibeer,
Inventor & Patentee.

List of Towns and Names of Persons who have established the Patent Funeral Carriage, and taken the exclusive Licence for their District.

HOTEL KEEPERS &c.

Manchester,	Mr. Long, Royal Hotel.
Liverpool,	" Morris.
Plymouth,	Cemetery Company.
Exeter,	Mr. Gellings, Black Horse.
Wettingham,	" Rutland.
Sheffield,	" Morton.
Stanley,	" Whitaker, Larcum's Head.
Nottingham,	" Bromley.
Northampton,	" Higgins, George Hotel.
Worcestersfield,	" Shore, Bull's Head.
Gloucester,	" Coff, Bell.
Salisbury,	" Jones, White Hart.
Gloucester,	" Elly, Royal Oak.
Derby,	" Harriman.
Leeds,	" Prince.
Nottingham,	" Vance, Sun.
Doner,	" Packham.
Marketfield,	" Parker, Railway Hotel.
Cheshamford,	" Chast, Bell.
Chatham,	" Minch, Sun.
Gloucester,	" Spencer, White.
Hereford,	" Mrs. Brodley, Crown.
Worcestersfield,	" Mrs. Evans, Newgate House.
Newport,	" Hallen, Newgate.
Leominster,	" Grosvenor, Sun.
Gloucestershead,	" Longgrove, Bear.
High Wycombe,	" Vernon.
Reading,	" Jackson, Crown.
Abingdon,	" Wallis, Green Swan.
Cardiff,	" Munstone, Railway Hotel.
Colchester,	" Chapman, Cup & Wheel.
Stall,	" Mrs. Widdow & Smithson.
Reading,	" Silvers.
Cardigan,	" Parker, Black Lion.
Brighston,	" Mrs. Palmer, George Sun.
Leighton Buzzard,	" Rushell, Swan.

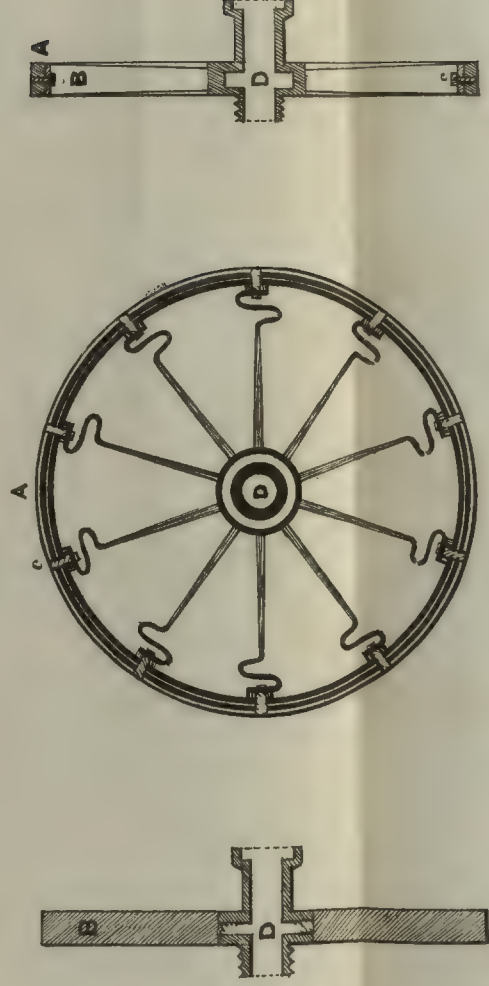
DRAPERS.

Winchester,	Mr. Northcote.
Exeter,	" Ho & Storer.
Birmingham,	" do.
North,	" Mrs. Shaw & Beale.
Exeter,	" Grenville & Bournes.
Wigan,	" Waterson & Son.
Northampton,	" Cook & Praper.
Gloucester,	" Spencer.
Cambridge Wells,	" Mr. Edwards.
Cambridge,	" Stagle.
Exeter,	" Mrs. Westman & Co.
Gloucester,	" do.
Weymouth,	" Mrs. Musgrave.
Gloucester,	" Mrs. Baascombe.
Northampton,	" Smith.
Northgate,	" Schoolfield.
Leeds,	" Mrs. Smalpage & Kirby.
Gloucester,	" Mrs. Caddington.
Exeter,	" Storer.
Newbury,	" Bodman.
Leicester,	" Brinknell.
St. Albans,	" Mrs. Cherry & Co.
Northampton,	" White, White & White.

ELASTIC COACH WHEEL, Provisionally Registered by

THOMAS SHILTON,

Raddeley, Ensor, near Atherstone



This Design furnishes an economical mode of elasticity in wheels for Carriages &c.
Fig. 1. is a side view of a Carriage. — Fig. 2. an edge view showing the spokes
screwed into the Bush. — Fig. 3. is an elevation showing the hollow Bush to
contain oil, &c.

A. The rim of the Wheel. B. The tempered Steel Spring spoke. C. The screw
that holds the spoke and rim together. — D. The Hollow Bush which the Spring
spoke is screwed into.

This Wheel is an excellent principle for the silent or coated Carriage Wheel,
as the solid or straight spoke wheel cuts the coating to pieces, which this wheel
does not.

The novelty of this wheel is its being of an elastic construction of the spoke,
which gives ease to the horses, and causes an easy draught in going up hills, and
and does away with the rumbling noise in going through paved streets or bad
roads, and will also give elastic power to Machinery in motion. — This wheel will
also be found superior to any other in all kinds of Vehicles, Lathes, &c. &c.
A horse will do more labour with this kind of wheel, in consequence of the
diminution of friction and requiring less power to draw.

With this wheel, Carriages may be made without springs and it will also
save the expense of felloes, and should the wheel get damaged, the spokes may be
taken out singly in a few minutes without altering the shape of the wheel.

A single iron hoop one fourth thicker than used in the common way or felloes
answers for the whole Tire or bearing surface and takes away the wood spokes and
felloes that are used in common wheels.

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1771

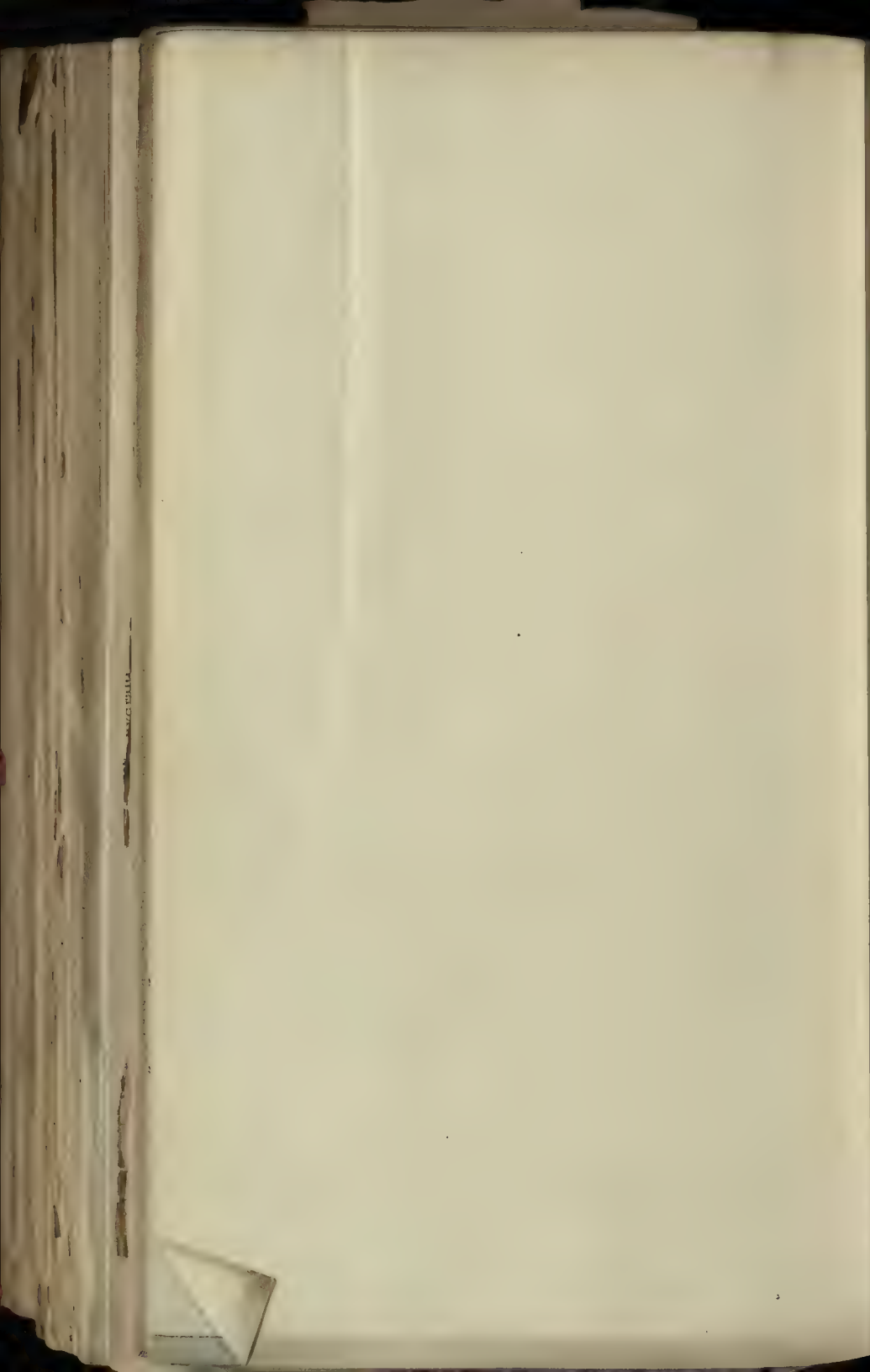
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1771

S. J. Smith



INVALID CHAIRS
ALL DESCRIPTIONS



By Her Majesty's Royal Letters Patent.



STOCKER, BROTHERS,

Hydraulic Engineers, Pewterers, Beer-Machine Makers,

AND PLUMBERS' BRASS FOUNDERS,

4, ARTHUR STREET, NEW OXFORD STREET.

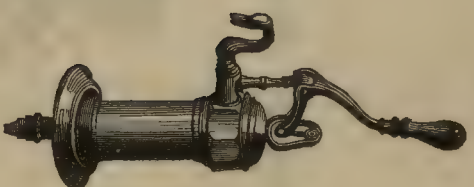
Illustrations of some of the Articles exhibited in the
Machinery Department of the Great Exhibition.

(CLASS V., STAND No. 422. --- Space, 168 Feet.)

No. 0.



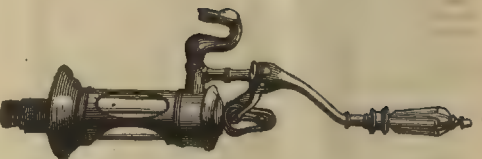
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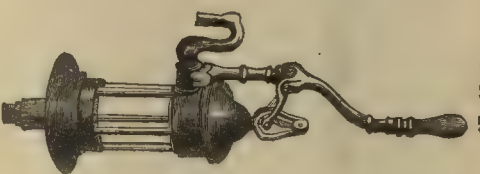
No. 2.



No. 3.



No. 4.



No. 0.—STOCKERS' PATENT PILLAR BEER MACHINE, in a cheap form.

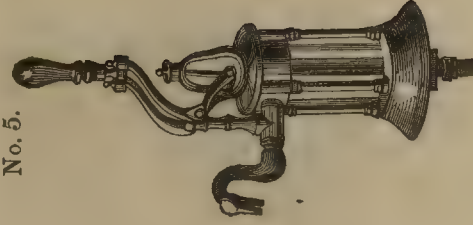
No. 1.—STOCKERS' IMPROVED PATENT BEER ENGINE.—This machine has earned a wide-spread notoriety for our Manufactory, above 10,000 of them having been sold previous to the end of the year 1850. It is chiefly remarkable for the parallel motion of the piston rod preventing the usual constant leakage at the stuffing-box through friction, and for the ready access afforded to the valves when choked.

No. 2.—Is a BRACKET PUMP on the same principle as No. 1, made to be fixed against a wall in conservatories, out-buildings, gardens, &c. It may be used for all the ordinary purposes of a Common Pump, or to force water &c. to the top of a house, or to a garden or cistern, and for all similar purposes.

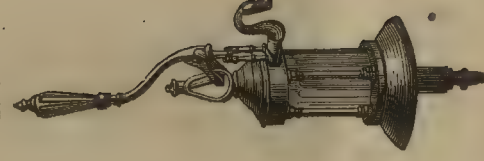
No. 3.—Is a Pump on the same principle, but having a Glass Cylinder, through which the Ale &c. may be seen.

No. 4.—Is another pattern of the same kind, with Cut-glass Cylinder.

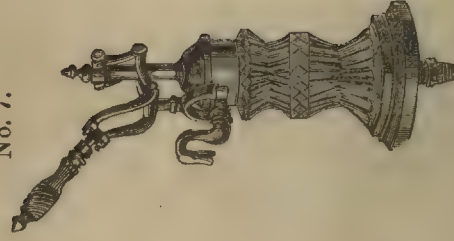
No. 5.



No. 6.



No. 7.



No. 8.

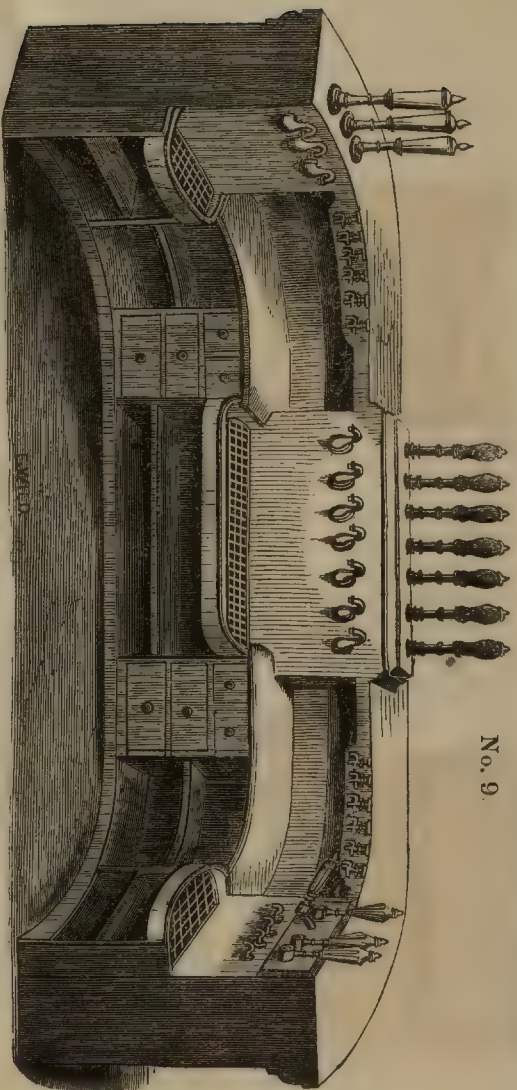


No. 5—Is also a Pump with a Cut-glass Cylinder.

No. 6—Is a very handsome design on the same principle, with Cut-glass Cylinder.

No. 7.—THE ROSHERVILLE PUMP. A very elegant article, the whole of the body being of richly cut glass.

No. 8.—THE ROYAL EXCHANGE PUMP is another design, the body being of Glass beautifully cut, and mounted in White Metal electro-plated with Silver. The principle is the same as that of all the foregoing, from No. 1 to 7.



No. 9.

No. 9.—A RECESS COUNTER, with Circular Ends, for the use of Licensed Victuallers. It has separate compartments for Beer and Spirits. The inside is of mahogany, and fitted with drawers, cupboards, and shelves. The top of the counter and the recess are covered with pewter. The outside is of deal, painted; the panels being portable, to allow access to the engines and to the spirit pipes, which run along the back of the counter.



No. 10.

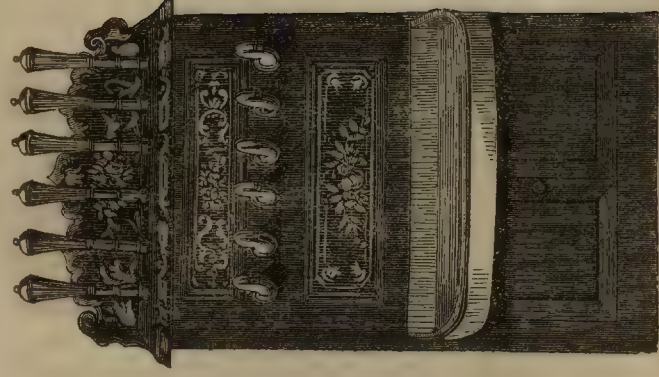
No. 10.—A SPANISH MAHOGANY COUNTER, on the same principle as No. 9, except that it is quite straight. The top of this Counter, as exhibited, was supported by elaborately carved trusses, bearing emblems of the Trade for whose use it is intended, being surmounted by a Bacchanalian head, with wreaths of barley, hops, and grapes; the spouts of the Beer Engine were beautifully chased, and in the form of swans' necks.

No. 11.—STOCKERS' PATENT ROYAL STANDARD CASE ENGINE.—This is a New Invention, for which Her Majesty's Royal Letters Patent were obtained preparatory to exhibiting it at the Crystal Palace. It has no slot or sweep for the lever handle to work up and down in, so that no dirt or grit can come into contact with the works, nor can any smell or draught from the cellar pass upwards. By this arrangement greater strength and durability are obtained. It is here shown in a Spanish Mahogany Case, in which form it has a great advantage over the old-fashioned Beer Machine; its beauty of design renders it a most desirable ornament to the Bars of first-class Public-Houses or Hotels. As a Counter Engine, it also presents peculiar advantages; it may be fixed with a handsome moulding, either in mahogany or pewter, standing a few inches above the counter, as shown in the Seven-motion of Nos. 9 and 10; or it may be made quite

No. 11.



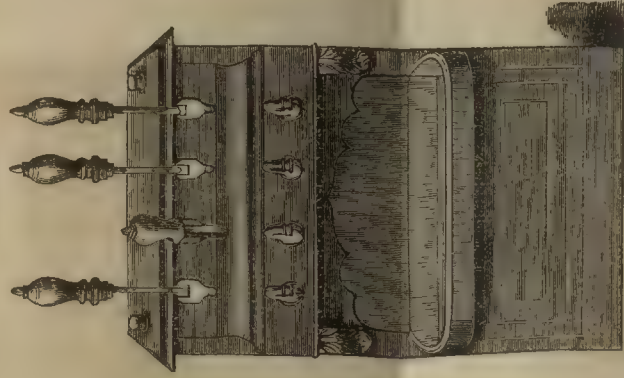
No. 12.



level with the counter, as shown in the Three-motion fixed in No. 9. Should it be preferred, it can be arranged for the lever to pull out through the edge of the counter, as in the Four-motion fixed in No. 9. In either case the lever comes out of a round hole the size of a half-crown, which, when the engine is at rest, is quite closed, preventing the unsightly appearance of the usual openings, and the inconvenience of having the handle between the spouts, as in other Counter Engines. It also prevents the loss of money through the same, and keeps the sand used in cleaning the pewter from dropping down upon the works.

No. 12—Is an Engine on the same principle as No. 11, in a Rosewood Case; the panels and showback is of papier maché, richly ornamented with floral designs, and inlaid with pearl. The spouts are swans' necks, and the handles of cut glass.

No. 13.

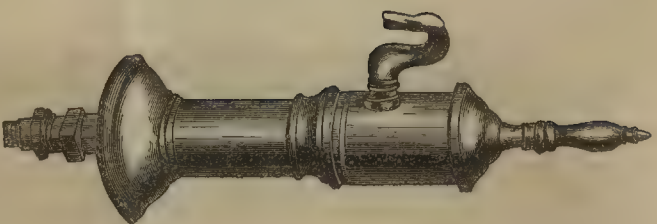


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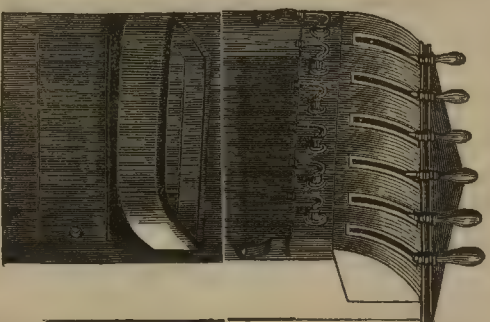


No. 13—Is an Engine in a Mahogany Case, on the same principle as No. 11, but of a different construction. The lever works through the front, instead of through the top.

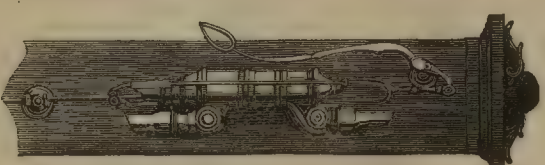
No. 14.—A BEER ENGINE in a plain Mahogany Case, on the same plan as No. 13, but in a cheaper form.



No. 15.



No. 17.

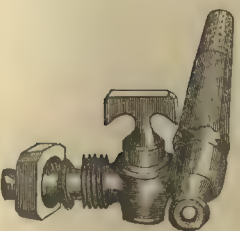


No. 15.—Is the old-fashioned Beer Machine, in Mahogany Case

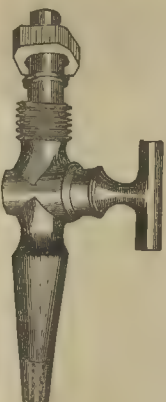
No. 16.—STOCKER'S PATENT ROYAL STANDARD PILLAR ENGINE, as shown for the first time at the GREAT EXHIBITION. It is so constructed that the handle forms a part of the pillar, and hence its name. It has a *perfectly parallel* action, and is considered by all Scientific Gentlemen who have inspected it to be the best ever invented. We apply the same principle to all kinds of Pumps. It is the most perfect and durable machine ever offered to the Public. There is much less trouble in cleaning, and the beer or other liquid cannot possibly leak over the top. It may be had in a highly ornamental form, or covered with paper maché.

No. 17.—STOCKER'S PATENT LIFT PUMP, in Polished Brass, on a Mahogany Plank. It may be had with a Japanned Barrel, and Polished Brass Handle and Sling; or in a commoner form, for ordinary plumbing purposes. The advantages of this Pump are such as every practical man will readily approve. It is chiefly valuable for the ready access afforded to the valves, all three of which can be removed in case of being choked or defective, and replaced again in five minutes, without disturbing the rising main suction pipe, or any of the gear-work;—a desideratum which will recommend it to all who have felt the inconvenience and trouble caused by the old plan.

No. 18.



No. 19.



No. 20.



No. 21.



No. 22.



No. 23.



No. 24.



No. 18.—STOCKER'S PATENT TAPPING COCK, which cannot be injured by being driven into the cask. It has a screw bottom, and is made of the best brass.

No. 19.—A COMMON TAPPING COCK.

No. 20.—A STRAIGHT UNION.

No. 21.—A CEILING UNION. A very necessary article where there is a great weight of pipe, as it prevents the vibration of the same from loosening the nut at the bottom of the beer engine, and keeps it off the ground.

No. 22.—A HOP STRAINER, which, being soldered into the pipe in the cellar, prevents the hops (as in Pale Ale) or other sediment from passing into the valves of the Beer Engine. It has a very finely perforated chamber inclosed in a Union, so that when it is full it can be removed for cleansing.

No. 23.—A FRONT STOP COCK, as used for Beer Machines where the beer is on a level with the Bar, or where the liquid is new or in a high state of fermentation.

No. 24.—A SUPERIOR Ditto, with Screw Bottom.

No. 25.



No. 26.



No. 27.



No. 28.



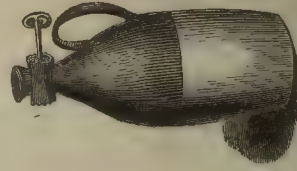
No. 25.—A SPIRIT FOUNTAIN, with Mahogany Pillar. These articles are made of different designs, and, where necessary, to drawing.

No. 26.—A Metal FOUNTAIN FOR SPIRITS, with Gas-light on top; made to order, in brass, pewter, &c., of various sizes and designs.

No. 27.—STOCKERS' PATENT DECANTER, with Self-acting Stopper. The act of raising the decanter from the table opens, and that of replacing it closes the stopper. No flies, dust, or dirt can get into it, nor can the wine be deteriorated in a smoky or other atmosphere. The inconveniences of breaking the stopper, or of its tightening in the neck of the decanter, are by this plan prevented. Made in different designs. Old Bottles can be mounted.

No. 28.—A WATER BOTTLE, for Eating-houses, Coffee and Smoking Rooms, &c., on the same principle as No. 27.

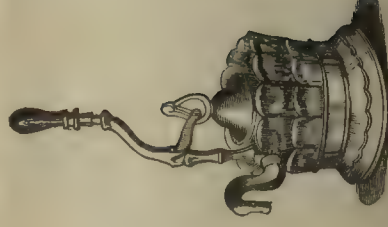
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No. 30.



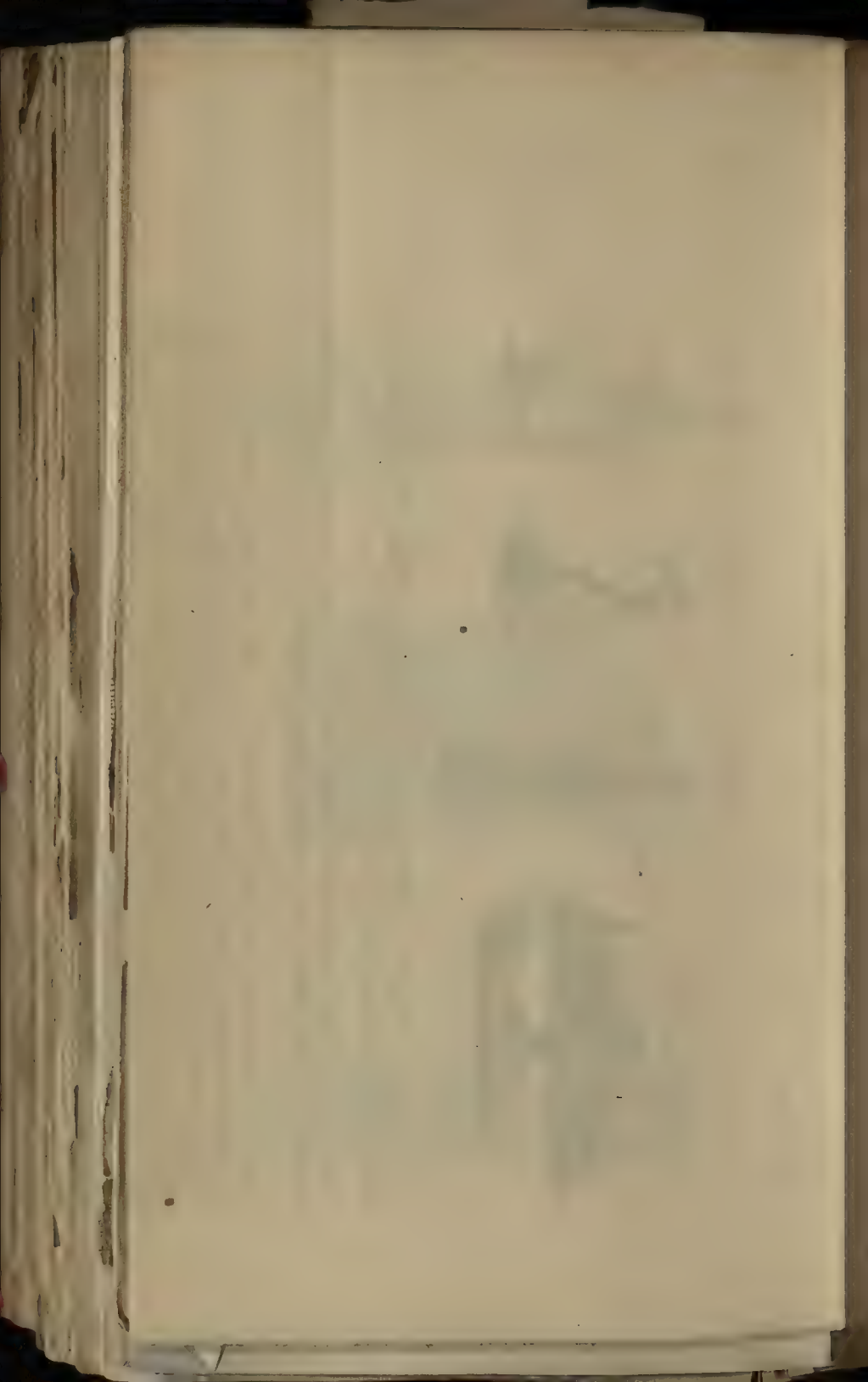
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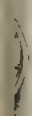
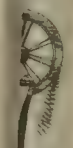
No. 29.—STOCKERS' PATENT JAR or BOTTLE, which is so constructed as to dispense with the ordinary corking. It requires no sealing-wax, capsule, wire, or string, nor any of the common means for securing the bung or cork. No corkscrew or other apparatus is required to open it. It may be opened and closed a hundred times in a minute, yet is perfectly air-tight. It can be had to lock, so as to be secure against the pilferer.

No. 30.—An APPARATUS FOR ICING Ale and other Liquors in summer, and warming them in winter.

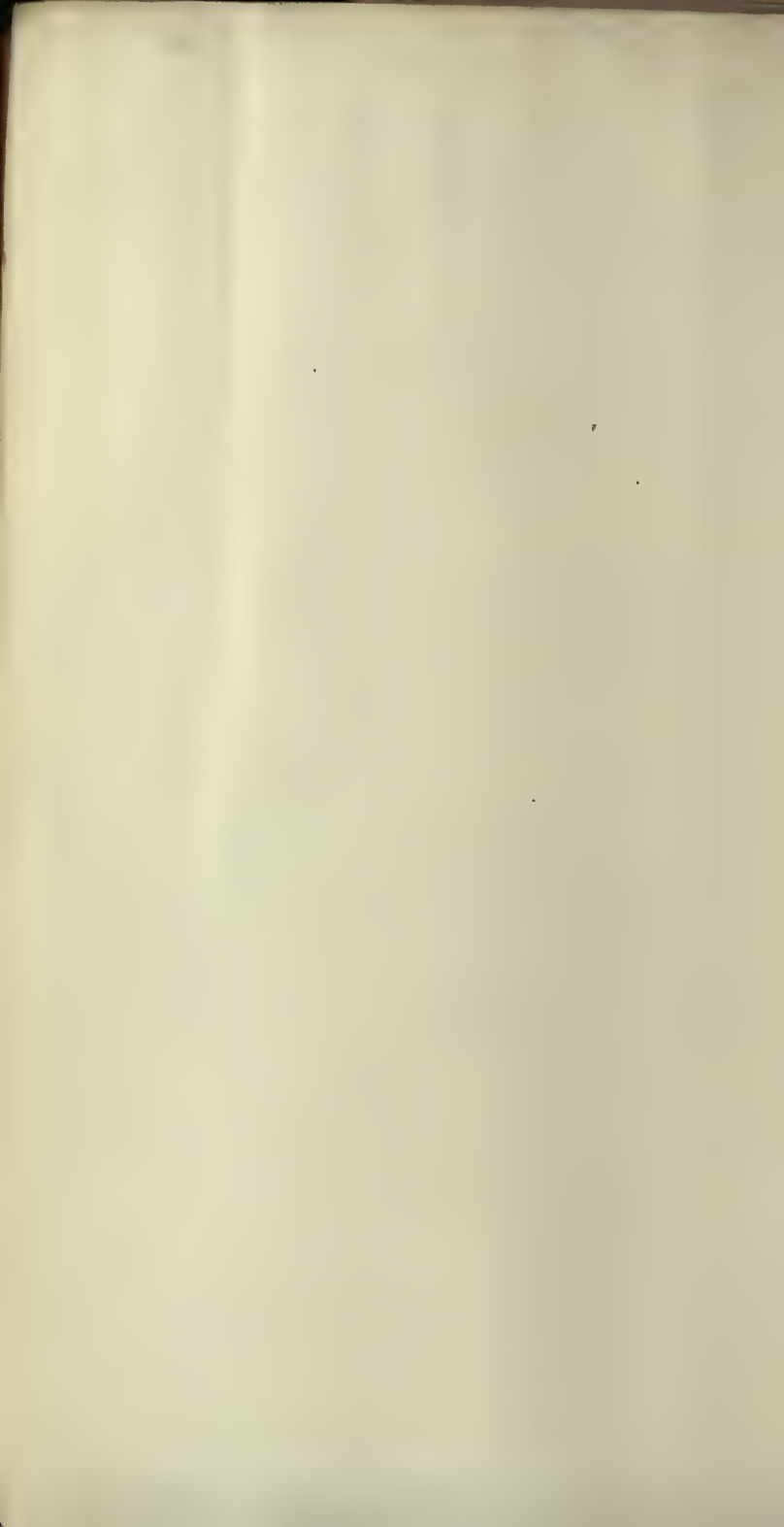
No. 31—Is a PILLAR BEER ENGINE, with a Patent Ice Cooler round it, which cools the Ale as it is drawn.



Copy



INVALID CHAIRS AND SEAT PLACES OF ALL DESCRIPTIONS
FOR THE USE OF THE SICK AND INVALID



STOTHER, SLAUGHTER, & COMPY., Manufacturers of Marine, Locomotive and Stationary Engines,

BRISTOL.

SLAUGHTER'S PATENT COMBINED PROPELLER ENGINE.

THIS system, which has reference only to Condensing Propeller Engines, purports to combine the advantages of a Direct-action, Quick-working Engine, with those of the Indirect Slow-working Engine, in which latter, the speed requisite for the Propeller is obtained by means of Accelerating Gearing driving on to a second-motion Shaft, and claims to avoid the disadvantages of both.

It is assumed, that, to attain the best possible form and angle of Screw, it is in all cases desirable to give a speed to the Propeller Shaft unsuited to the Vacuum, Supply, and Bilge Pumps, but especially to the former; and that whereas the required number of Revolutions presents no practical difficulty in those portions of the Engine where the passage of steam only is in question, very great difficulty, and an undue amount of wear and tear, as well as loss of power, attach to the rapid opening, closing, and constantly repeated shocks of large and numerous valves, required for the passage of water through the Vacuum Pumps for the process of Condensation.

So greatly is this difficulty estimated by some of the first naval engineers of the day, that the Indirect Engine, with its cumbersome and costly Gearing, is preferred to the light, simple, and inexpensive Direct-action Engine; and this preference obtains in spite of the very strong prejudice entertained against the employment of Gearing under any form on shipboard. Under the present system, Direct Action to the Screw Shaft from the Steam Pistons is obtained, in connection with a reduced speed of the Vacuum Apparatus, by means of Gearing of a lightness proportioned to the fraction of power required, say $\frac{1}{10}$ part of the entire power of the Engine.

It may be said, that Direct-action Engines are in successful operation, in which the Vacuum Apparatus is made to work without difficulty at the same speed as the Steam Pistons. Now, if this cannot be denied, it is submitted that the speed, and therefore the angle of the Propeller, must be lowered to the speed suitable for the Vacuum Apparatus; that they do so work at a considerable loss of power, by reason of the unduly large relative capacity of the Air Pumps, at a much increased ratio of wear and tear of machinery, and, as it can scarcely be doubted, with much greater risk of accident.

It will be readily understood, that the system must be considered irrespective of the particular arrangement exhibited, which had in view to economise space in the vessel longitudinally; and that Cylinders, disposed horizontally or otherwise, are equally applicable, and the horizontal disposition would be adopted for war steamers.

In illustration of the above, the Marine Condensing Engine exhibited (100-horses power), may be regarded as divided into two parts comparatively distinct one from the other, the Steam portion working directly on to the Screw Shaft with all the simplicity of a High-pressure Engine, at a speed of 120 revolutions per minute; the Vacuum Apparatus, as well as the Supply and Bilge Pump, being made to work at the reduced speed of 40 reciprocations, or about the approved speed of Paddle-wheel Engines of same power. It may here be well to state, that the relative capacity of the Vacuum Pumps and the Steam Cylinders, must be calculated in reference to the difference of speed; and that in practice, the Vacuum produced in the Condensers, is found to be as perfect as that in any existing Engines, viz., 28 and upwards. A pair of Engines, identical with these, is at work in the Bristol Channel. The system has been proved with equal success in a small experimental vessel, in which the speed of Vacuum Apparatus is only $\frac{1}{3}$ instead of $\frac{1}{10}$ of that of the Steam Pistons.

The following advantages are claimed:—

High Speed upon the Screw Shaft, in connection with Slow Speed of Vacuum Apparatus, *in the same machine.*

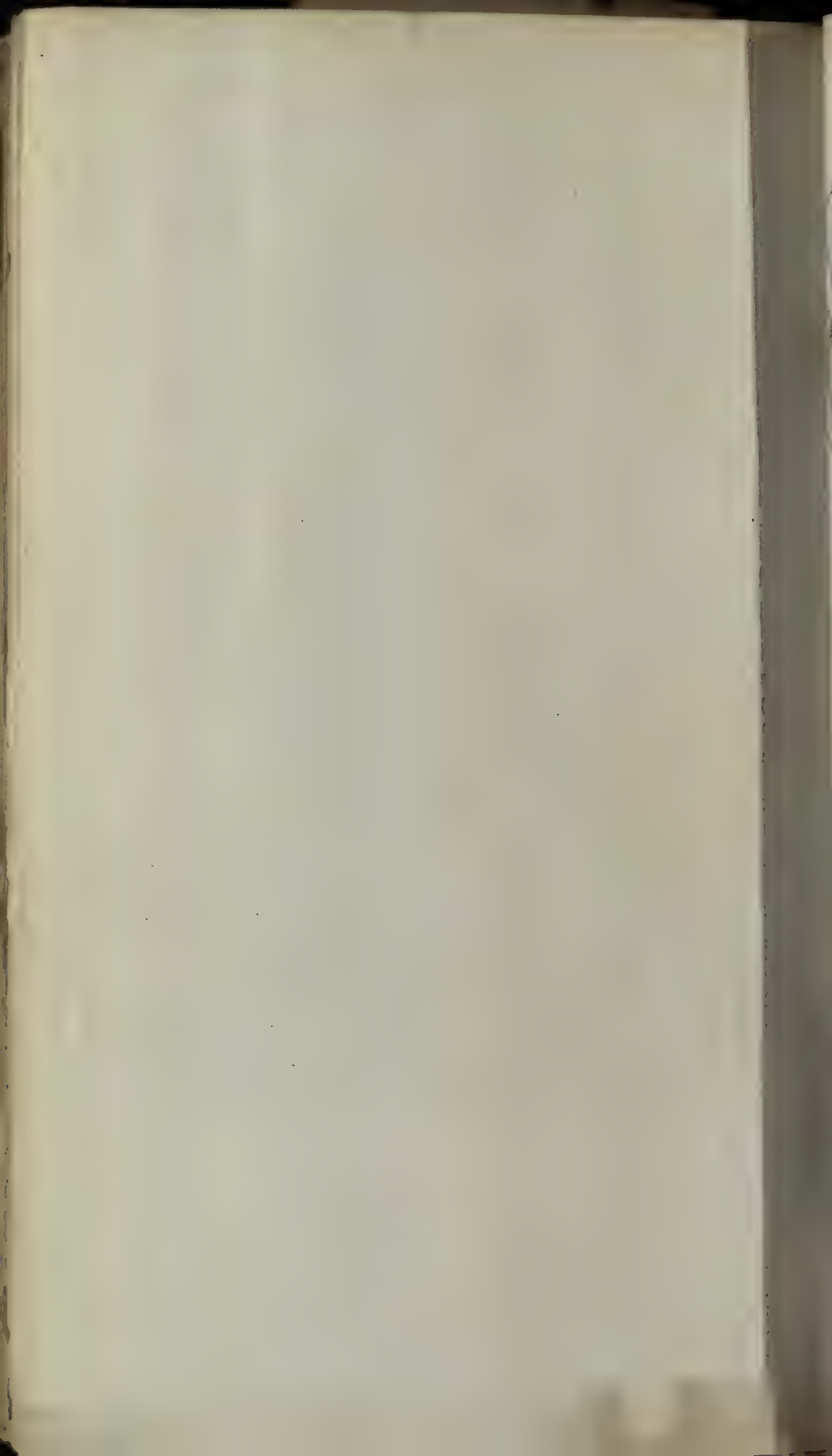
No reasonable limit to the *High Speed* required for Screw Shaft, giving facility for securing the best form and angle for Propeller.

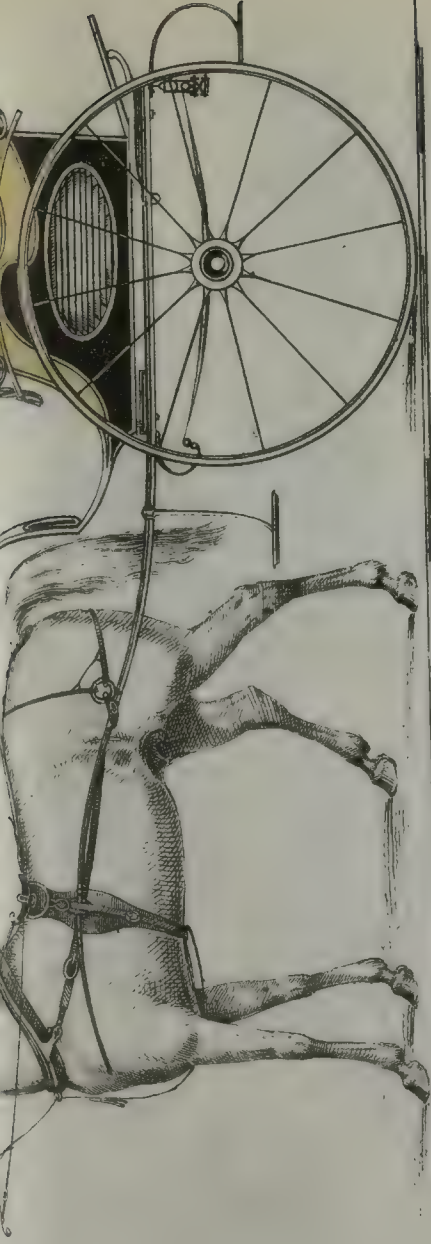
No reasonable limit to the *Reduction of Speed* required for Vacuum Apparatus, with diminished risk of accident resulting therefrom.

Saving of Power by reason of relatively reduced proportion of Vacuum Pump, and consequent saving of Fuel.

EDWARD SLAUGHTER, PATENTEE.

AVONSIDE IRON WORKS,
May, 1851.





GEORGE THOMSON'S

Self-Balancing Dog Cart

CRYSTAL PALACE, CLASS V. N° 978

Registered.

Opinions of the French Press. — *L'Espece Universelle* of 2nd July 1851 says.

"We have just received six drawings from the London Exhibition viz. First, an American Cart exhibited under No 978 and belonging to Mr. Thomson, Coach-maker at Hirling. This Cart is upon two wheels as on fine style and exquisite taste: it is a charming delightful vehicle." The same paper of 16th August, contains a beautifully executed drawing of the Cart, and further says:—"This small Dog Cart has two and four places, and while in its original form the body or foot is large enough to contain several dogs. It has also the advantage of being as light as the common Cart. The shafts being made of lance wood have a certain degree of elasticity and their being carried in their springs sufficiently secures their strength. In raising the foot board merely with the hand; for the purpose of shutting the foot and of reducing the seat on the carriage from four to two the body slides back of itself and without the least effort it is then placed right for two persons, so that the horse is not too heavily loaded on the back. Its mechanism is easily understood and very well executed."

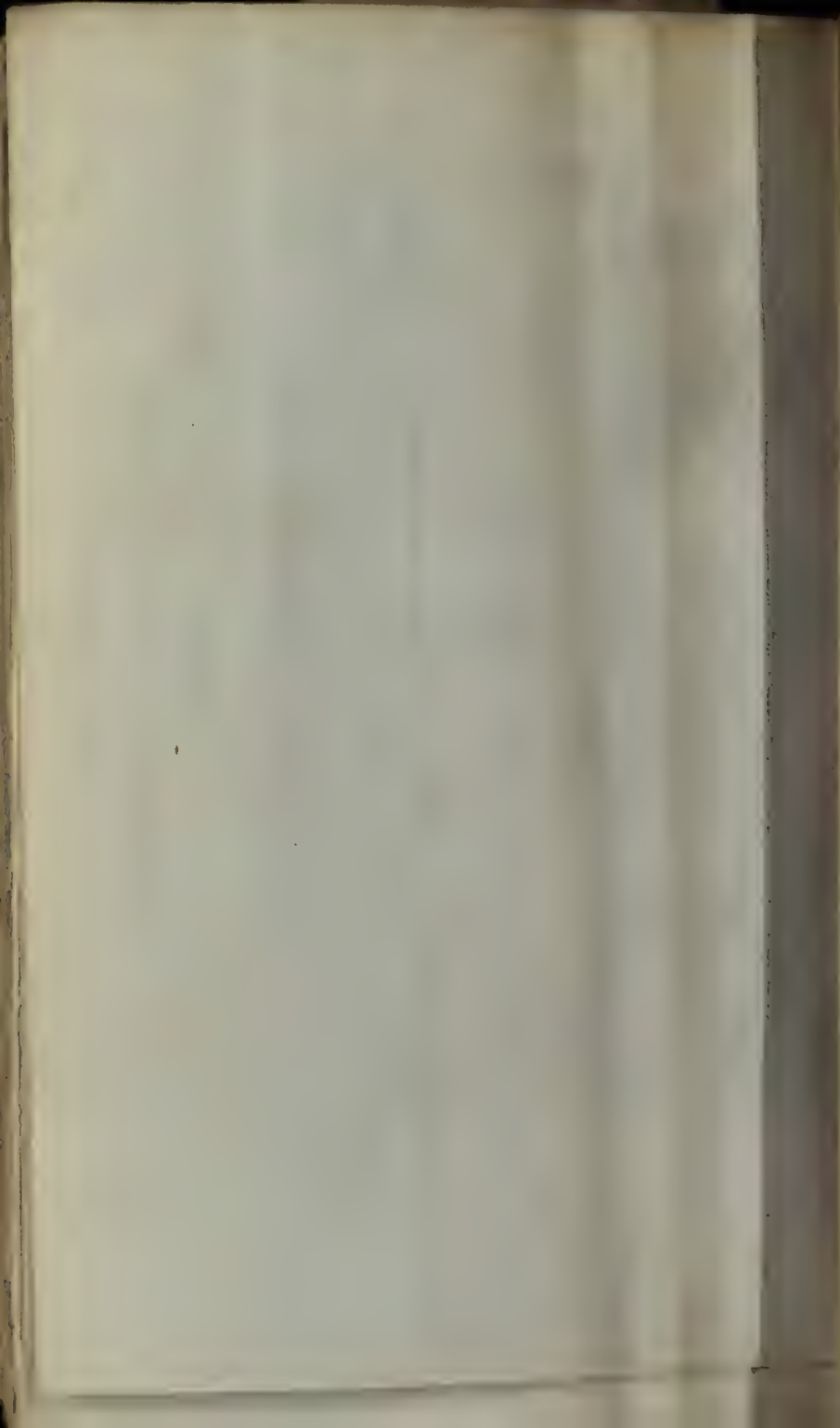
Signed, Auguste Bergeant.

George Thomson having secured by Registration for the three kingdoms his new mode of altering the balance of two-wheeled Vehicles is now enabled to offer his truly Registered *Self-Balancing Dog Cart* and all other Carriages at very moderate prices and of best workmanship & material.

Two Volumes of Carriages and Prices forwarded upon Application.

Hirling Sept. 1851.

Hirling



By Special Appointment to Her Majesty,



IMPROVED INVALID CHAIR AND CARRIAGE MANUFACTURER,

SEDAN CHAIRS MOUNTED ON WHEELS FOR THE LAWN.

MERLIN AND OTHER SELF-PROPELLING CHAIRS UPON THE NEWEST AND MOST SCIENTIFIC PRINCIPLES.



1. J. WARD'S PATENT EXERCISING CHAIR, HIGHLY RECOMMENDED BY THE FACULTY.

2. PATENT RECURBENT CHAIR.

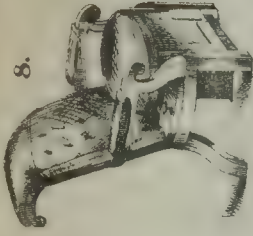
3. D. O. IMPROVED OPERATING DENTIST'S CHAIR, SUITABLE FOR A CHILD OR ADULT.



6.



7.

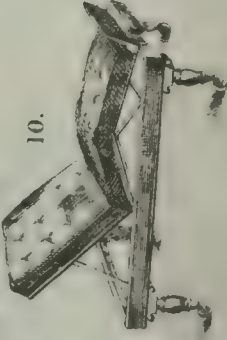


8.

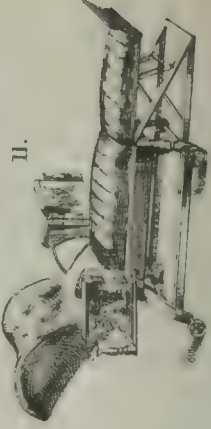
9. EARL'S DOUBLE RISING INVALID BEDS, WITH ALL THE LATEST IMPROVEMENTS.



9.



10.



11.

12. A THREE WHEEL BRIGHTON CHAIR, MOUNTED ON C SPRINGS.



12.

13. A FOUR WHEEL BRIGHTON CHAIR, DRAWN BY HAND OR ANIMAL.



13.

14. SOFA BRITZKA SPINAL CARRIAGE.



14.

15. ROUND PANNELLED BATH CHAIR, — SPRING FRONT IRON AND GERMAN SHUTTERS



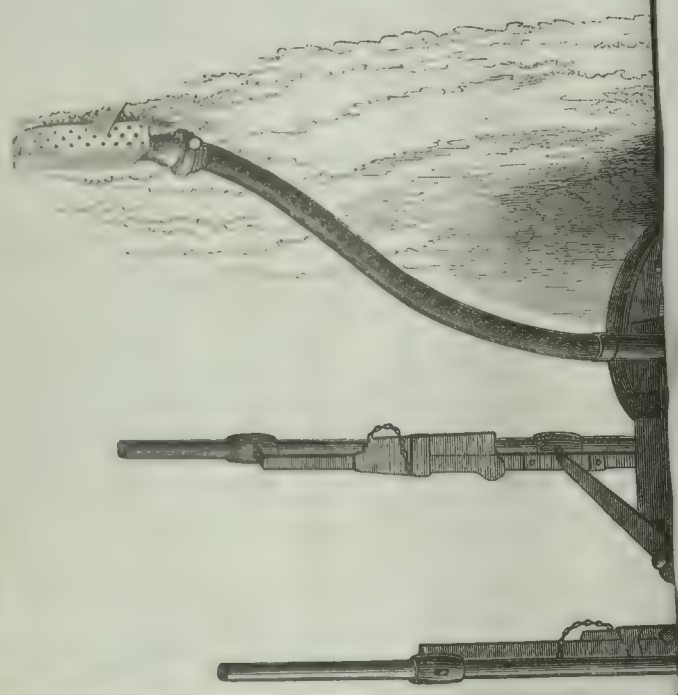
15.

NS,

NO.

s, with Warners' Registered Universal Spreader, &c.

For 30 Men, 7-in. Barrels
Will discharge 100 Gallons per minute to an alti-
tude of 60 to 70 feet.





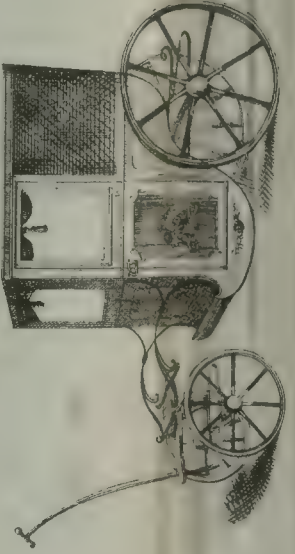
This Invention has proved to be a real blessing to humanity, and I would say great pleasure in assisting to make known an improvement of such importance to the healing art, particularly as its value is not matter of speculation and, inasmuch as its benevolent author, Dr. Arnott freely allows its use, wherever the wants of his fellow creatures requires the application.

This Bed is warm, owing to Water being nearly an absolute non-conductor of heat from above, downwards, and owing to its allowing no passage of cold air from below, it greatly facilitates turning for the purpose of dressing wounds, which is done by raising the Blankets on one side, or depressing the other, or merely by the Patient extending a limb to one side. The Author has now run enough of the effects of this Bed to enable him put it a duty at once to publish a notice of it. With all the great Immunities called 'Strapping', now so common in fevers and other diseases, need never occur again, and not only will it prevent that formation but by alleviating the distress through the earliest stages, it may prevent many cases from ever reaching that degree of danger. It is also applicable to cases of 'Broken Bones', and any other Surgical injuries, where persons are obliged to pass much time in bed. There are numerous other professional adaptations and modifications of it which will readily occur to Practitioners.

Directions for using the Bed.—The Bed should be placed where it is to be used, if as a Couch, or by drawing the two end screws and taking away the foot of the Bedhead, also the Laths or slats, when the Hydrostatic Bed may be placed on the 'Couch', or on either side, with out displacing or removing any of the Furniture or Carving of the Bedhead. When the Bed is placed where you wish to use it, then, and not before, fill it with water, until within four inches of the top, and for the purpose of making it fit for immediate use, mix about twelve gallons of hot Water with the cold, in filling the Bed, which will bring it at once to the temperature of the Room. A pair of 'condensed' Sheets is sent with each Bed, one of which has to be laid upon the Sheet that lies upon the Mattress, and to be exchanged when damp from perspiration; two or three folded Blankets must be next added, after which Sheets and Pillows, as commonly used, in ordinary Bed.

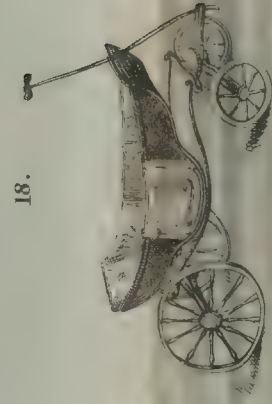
It must be particularly noticed that Oil, Varnish, Paint, or tincture of any kind, containing the least portion of grease or oil, will, infallibly, destroy the Water Bed. Quality of the Cloth.—'Cottons' against punctures may seem unnecessary, but they have been thoughtfully made in sh., and of course, the water they come through.

ALBERT BODY CHILDS CHAISE.

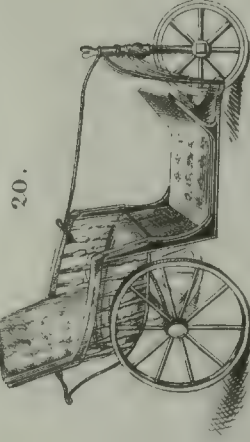
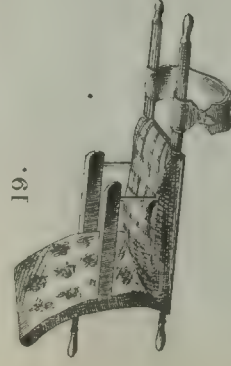


BROUGHAM CHAIR, WITH GLASSES TO SHUT DOWN, SPRING ROLLER, BLINDS, &c, WITH OR WITHOUT SHAFTS.

CHILDS BAROUCHE.



CHAIR FOR CARRYING INVALIDS UP & DOWN STAIRS.



BATH RAIL CHAIR.

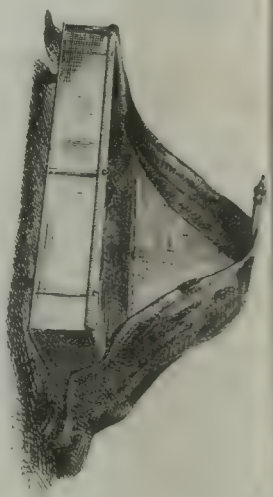
INVALID BED CHAIR.



I W. beg most respectfully to inform the Nobility, Gentry, and Public that he has always on show an Apartment of every article adapted to the relief and comfort of Invalids, including Spinal Beds, Patent Rheumatic Chairs, Portable Carriage Chairs, Spring Cushions, Spring Mattresses, &c, &c, upon the best and most approved principles.

I W. would further beg to call the attention of the Nobility and Gentry to his Patent, evering Chair, highly recommended by the Faculty for passive exercise, being considered by them highly useful to those persons who suffer from any 'Abdominal Congestion' or other Chronic disorder, &c, &c.

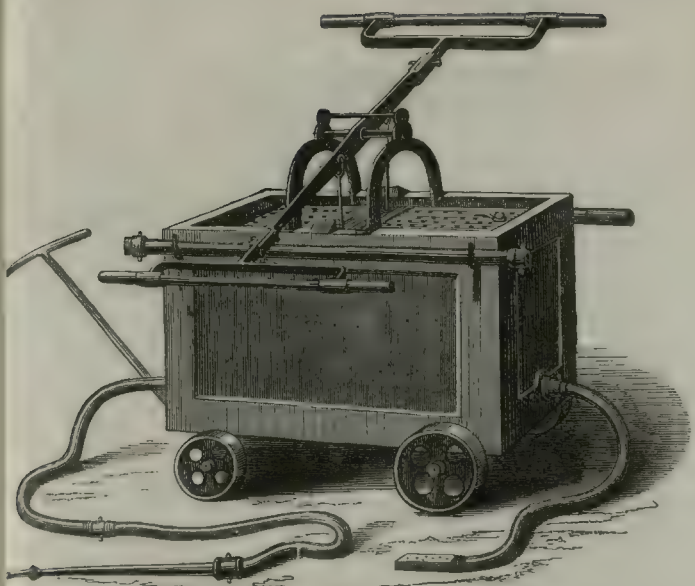
D^r ARNOTT'S HYDROSTATIC BED FOR INVALIDS.



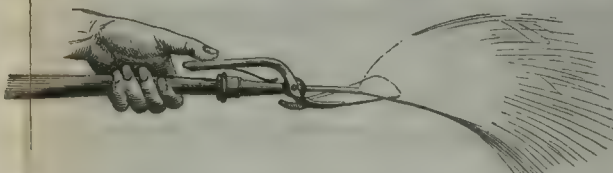
which has proved to be a real blessing to humanity, and I.W. and his
 in, according to many former and experienced of such importance to the
 particularly as its value is not matter of speculation, and, inasmuch as it
 Dr. Arnott's bed allows to use, wherever the wants of the patient require
 application.

As however, owing to the long, nearly an absolute non-conductor of heat from
 it, and, owing to its allowing no passage of cold air from below, of greatly facilitating the purpose of dressing, secondly, which is done by raising the blanket on
 dressing, the effect, or, merely, by the patient, substituting a kind to one side.
 has been seen enough of the effect of the bed to make them feel it a duty at
 a notice of it. With it the fatal hemorrhage called "stomping," now so common
 other diseases, need never occur again, and not only will it prevent that hemorrhage
 the disease through the earliest stages, it may prevent many cases from ever
 degree of danger. It is also applicable to cases of "backward lying," and any other
 cases, which persons are obliged to pass much time in bed. These are numerous other
 applications and modifications of it which will readily occur to practitioners
 as for using the bed. The bed should be placed upon a bed to be used. It
 persons who suffer from any

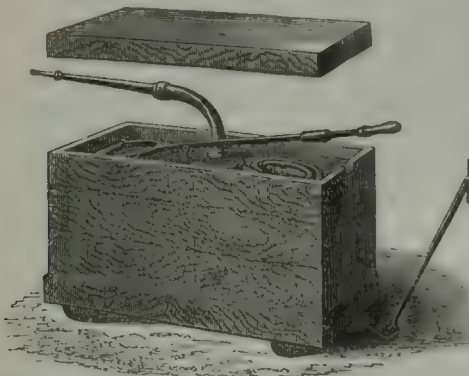
WARNERS' REGISTERED UNIVERSAL SPREADER.



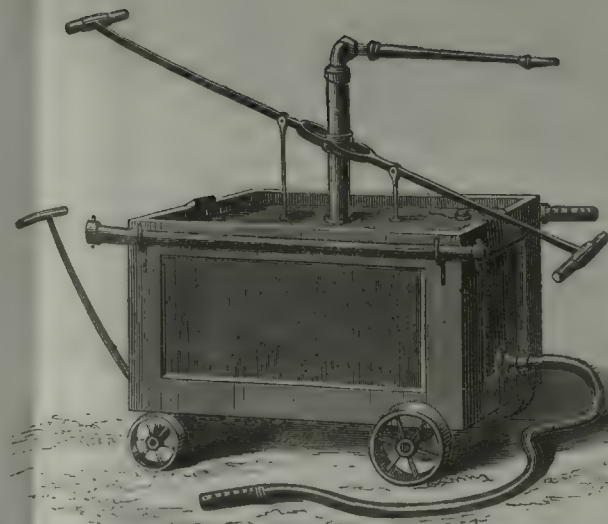
No. 26.—Fire Engine for 6 or 8 Men, with Folding Handles, for the convenience of passing through Doorways and Narrow Passages, with Branch Pipe, and 10 Feet Suction Pipe (will deliver 30 Gallons per minute to an altitude of 50 Feet). 1½ Hose Pipe extra per foot.



When attached to the Branch Pipe of Fire Engines and brought into use where Corn, Hay Stacks, Weather Boarding, &c. are on Fire, will be found of the greatest service, and has ensured its application in most Fire Engine Establishments.



Cabinet Fire Engine, with Branch Pipe, and 15 Feet Leather Hose, enclosed in a painted Oak Chest: very compact and portable, for the protection of the Upper Floors of Mansions, and other large Buildings.



No. 30.—Fire Engine for 4 Men, with 10 Feet Suction Pipe, Branch Pipe, &c. will deliver 15 Gallons per minute to an altitude of 40 Feet.



No. 3.—Fire Engine, without Springs, Strong Wood Spoke Wheels, Draw Handle, Two Branch Pipes, with Warners' Registered Universal Spreader, &c.

Hose Pipe, Suction Pipe, and Hose Screws extra.

12 Men—4½-in. Barrels
16 " 5-in. "
18 " 5½-in. "
20 " 6-in. "
Extra, if required

2-in. Leather Hose for 4½ & 5-in. Barrels... per foot
2½-in. " " 5½-in. " " "
2½-in. " " 6 & 7-in. " " "
Copper Rivetted Hose or Suction Pipe—ex. per ft.

2-in. Suction Pipe on Wires.... per foot...
2½-in. " " " " "
2½-in. " " " " "
Leather Buckets, 2 Gallon...ea. 3 Gallon...ea.

1½-in. Hose Screws..... per pair
2-in. " " " " "
2½-in. " " " " "



LONDON FIRE BRIGADE ENGINE,

with Elliptic Springs on strong Wood Spoke Wheels, Salitex Box & Pole, Driving Box, Patent Lamps, Two Branch Pipes with Warners' Registered Universal Spreader.



A DESCRIPTION OF AN
ERIAL PONTOON RAILWAY SUSPENSION
BRIDGE,

TO CROSS THE CHANNEL,

FROM

ENGLAND TO FRANCE.

AND ALSO FOR

CROSSING LAKES OR RIVERS, OF ANY WEIGHT
OR ELEVATION.

EXHIBITED AT THE GREAT EXHIBITION.

1851.

BY THOMAS WATTS.

WITH AN APPENDIX.

Excluded to those persons who suffer from any disease or condition which renders them incapable of performing the duties of the office.

INTRODUCTION.

IN publicly proposing an original plan for throwing a Railway Bridge over the Channel from England to France, without doubt I must expect to meet opponents both from men of science and from the non-scientific; therefore I think it necessary to make a few Introductory Remarks. With regard to men of science, probably, many will say, the idea of constructing a bridge across the Channel is an impossibility; and with regard to the non-scientific, many will think that it cannot be done, just because "they only think so," without thinking for one moment how it is to be constructed, or giving any consideration about it at all; but if we only look back on the past twenty years, we shall see what a wonderful and surprising stride science has made, and is still making, for the benefit of mankind. Look at history for the last half century—a half century that will ever be remarkable for its wars, revolutions, peacemaking, and scientific progress; and who can tell the immense good mankind will derive from this peaceful and philanthropic effort of our "Noble Prince Albert," to call all those who can come, to benefit their fellow creatures in so great a social and homely point of view; again, who can tell how the next half century will be benefited by this noble undertaking of a truly noble potentate. Look at the greatest friends of man,—the Locomotive Engine and the Steam Vessel; for instance, the Locomotive Engine when it could only travel at the rate of about ten miles an hour, by many it was thought quite impossible to get at any very great speed, for three reasons: first, for want of steam; secondly, the great resistance of air; and thirdly, the great tendency of flying off the rails. Again, many thought that

no boiler could supply steam enough to overcome the great resistance of the air ; and if this could be done, that at a speed of about thirty miles an hour it would be impossible to keep an engine on the rails ; yet, we now travel at over seventy miles per hour, without those obstructions that were before thought impossible to overcome. Again, in turning our attention to the first steam vessel, it was thought impossible at first, but in course of time it was made to work on rivers very successfully ; it was then proposed to cross the Atlantic, but many thought this out of all reason. A vessel may work very well on rivers, say they, but never would be able to cross the Atlantic ; for two great reasons : in the first, the very heavy seas and the winds it would have to encounter ; and, secondly, the impossibility of carrying coals sufficient for such a long voyage, thus condemn the whole affair ; yet all this was overcome ; and had the proposers for steam-vessels to cross the Atlantic always listened to their opponents, we never should have had steam to all parts of the world, as we now have. Again, if we only look back so short a time, when the great "*tubular bridges*" were in contemplation ; here we may observe an original plan of engineering condemned at once. In the views of many people this was sure to fail, by its own enormous weight, yet, by the efforts of Mr. Stephenson, and other eminent engineers, they have been brought to bear the weight of many trains, running through them at thirty-five miles per hour, to the great surprise of "*La, I shouldn't have thought it.*" Again, the careful reader may now turn his attention to electricity, and see the wonderful strides it has made in so short a time, and will, no doubt, be considerably improved upon for the benefit of all. Many other important things could be enumerated, but the four I have adduced will suffice.

Now, who can deny the practicability of balloons, or that

hydrogen is fifteen times lighter than atmospheric air, giving them power to rise in the air, with such a great weight that has been done ; then why not this great power be employed for a sustentation to any object stationary in the air, and so by this means construct a bridge across the Channel, river, or lake, similar to a bridge of boats ; the one floating on the water, the other to float in the air. The importance of this railway, in a social point of view, would be very great ; for the more so, a line that only joins one large town to another, and both of the same country ; but here we may have a railway to connect the whole of England, Scotland, and Wales, direct with France, and all the remainder of the continent of Europe, an important and social point of view, well worthy the great consideration towards it. And when it was not employed as a machinal means for conveying, a platform could be laid down for foot passengers, and in constructing a bridge with 6, 12, or 20 pontoons, there would not be any working over the river, as the whole could be made on the shore and floated over at one time. As for its success, it could soon be ascertained : supposing we have a piece of framework for the bridge, weighing so many tons, this would take so many cubic feet of hydrogen gas to support it ; this being ascertained, we have only to enclose it into as many pontoons as we think best. In order to prove the practicability and the best means of constructing aerial pontoon suspension bridges, I have tried many experiments, and with one model 18 feet long, and 6 inches wide, on the same principle as that exhibited, totally supported by aerial pontoons, I was enabled to raise and lower the bridge to and from the ground, by simply turning a tap, inflating and exhausting the aerial pontoons with the most perfect success.

THE BRIDGE.

The Bridge is to be composed of preserved timber and wire cord, as being the strongest and most effective in economy for its construction. It is to be supported by aerial pontoons, and moored by means of anchors; each girder to be 300 feet in length, and trussed with the kingposts and wire cord; the end of each girder to be connected by morticing, and bolted at the joint; these ends would again be trussed with a wire cord and a king-post at the connecting joints of the two girders; this plan would then form a solid girder from coast to coast; and by this means would extend the weight of any object at a very great distance on each side of it: so that if a carriage was standing in the centre of the Bridge over an aerial support, or at any point, by this means not a 20th part of its weight would be where it was standing, but about 20 or 30 aerial supports would be brought into action at one time to help bear the weight up exposed to any one of them. This is a very great economy, and safety in its construction. The timber of the girders themselves will form the sleepers for the rails.

The girders will be placed 40 feet from each other; this will form a 40 foot gauge for the line, and will be kept firm by cross timbers, and then doubly crossed braced horizontally inside the girders, and the ends of the bracing fasten behind the joints of the girder timbers; hence, this will give an extra strength to the joints; the cross bracing will keep the bridge firm horizontally against the winds and the oscillation of the carriages. Again, to be cross-braced at every king-post; this would give a considerable firmness to the whole of the work; and by this means, if a man was standing on one side of the bridge, very near half of his weight would be on the opposite side at the

same time ; the same effect would be with any unequal pressure of the winds, so that the bridge would always be kept level.

THE AERIAL PONTOONS.

The aerial pontoons to be 120 feet in length, and 40 feet in diameter, and are to be inflated with pure hydrogen, to be made of a cylindrical form, so that the winds would not have any great effect upon them, but, on the contrary, would help bear them up in their places by the backward pressure which would be caused by this form ; again, the pontoons would be shielded along the centre, so that the winds would only act at the upper and lower surface of the pontoon ; this, with their own pressure of gas inside, would stand the effects of the winds to a very great extent, and would not have the effect of destroying them, as might be supposed ; these supports to be placed at the ends of each girder, underneath between the connecting-posts ; so that the centre of each support would be 300 feet apart, and the ends 180 feet.

THE MOORINGS.

The bridge to be moored in its place by anchors, eight to be placed at every 900 feet, four on each side of the bridge at a very wide angle ; this would keep the bridge secure both from rising or shifting in any direction. These would be formed on a very economical principle, both effective, and a very great saving of a dead weight and strain to the bridge ; they are to form an angle at the bottom of the water. Three of these anchors are to be placed in a line with the bridge at equal distances apart, and one in the opposite direction ; chains are to come from each anchor, and all to meet at one point, here to be fastened together, and a buoy to be

fastened to the same ; this buoy to float 6 or 10 feet under low water mark ; so that the three anchors would hold the bridge and buoy, and an anchor on the opposite side would hold the buoy in its place at the turn of the tide ; so that the buoy would always be stationary at the 6 or 10 feet under low water mark. From this buoy would be fastened the main-stay from the bridge, which would be of wire cord.

Again, about 70 feet down the main-stay from the bridge would be fastened two more stays of a less strength ; each one of these would expand out 150 feet from the main-stay, the one 150 feet to the right, and the other 150 feet to the left hand of the main-stay, each one at the same time passing under the bridge, and fastened on the opposite side, so that these small cross-stays coming from the right hand main-stay, would be fastened on the left hand of the bridge ; the object of this would be to give a greater and more effective strength to the stays, in the steadiness of the bridge, in all directions.

The reader will now see, I presume, the plan I have adopted, viz., that instead of bringing my main-stay to the bottom of the Channel, where it would be exposed to the severe strains of the under currents, besides the vast number of the extra thousands of feet of cord it would take in crossing the Channel, which would be of an enormous weight of many tons ; again, and the severe strains of the under currents would have a very great tendency of pulling the bridge down, and at the same time putting to an unnecessary weight ; here let the reader observe, that I have now done away with all these evils, by bringing the main-stay to the buoy, at 6 or 10 feet under low water mark, instead of carrying it to the bottom of the Channel, and as a matter of course takes off those evils I have just alluded to.

THE CARRIAGES.

The carriages are to be 40 feet in length, and 10 feet wide; this carriage I proposed to be placed on a girder frame work, 200 feet in length, and 40 feet in breadth, the same as the gauge, working on six wheels, and so arranged that each wheel is to carry one sixth of the weight of the whole; the object of this is to expand the weight over a greater surface at one time, so as not to bring a great weight upon a point. Again, were it not for this plan there must be a vast number of extra king posts to support the intermediate timbers of the girders: this would amount to many thousands in crossing the channel, and again causing a great extra weight of many tons to the bridge, expence, and trouble; so that by adding this little extra construction, I again save all those evils which would arise, besides its safety in all points. An examination of the model will show a clear illustration of this great economy. In using more than one carriage, I propose that each carriage be placed 400 feet from one another, so that a train of three carriages would reach over a distance of 1200 feet; by this means the weight would be extended economically over the bridge, by two means: first, in the construction of the bridge itself, and secondly, in the construction of the carriages: this I believe to be a very great point towards its success.

THE ERECTION.

The plan for construction would also be simple and economical, as no scaffolding, or anything of the sort would be required. In the first place, I propose to construct it 300 feet out at sea: this to have its bearings from the coast. In the next place, I propose the 900 feet of framework, before alluded to—cross-braced—the aerial supports fixed—and

everything completed on the shore: I would then have the moorings ready, and fixed with the mainstay, at the 900 feet out at sea, measuring from the extreme end of the points of the bridge completed. As soon as this is accomplished place men on this piece of frame-work, then attach to it two steam vessels, allowing it to float in the air with its own accord, and by this means to be conducted to its place, and in the short space of one hour everything could be bolted, screwed, and the piece of framework fixed in its place; hence, this would remain secure till another piece of framework, 900 feet in length, could be attached to this, and so continued, one piece of frame-work after the other, till the whole was completed; these operations to proceed on both coasts till they meet midway in the Channel.

Now, supposing that both ends of the bridge were within one mile of each other, or even 200 feet, they would remain perfectly secure, till the key-piece of framing could be placed in, which would then complete the whole bridge, the king-posts of the bridge at the same time forming a ready and economical contrivance for carrying the electric telegraph wires. I next propose that the trains be propelled by a locomotive power, for which I am now about two descriptions, and in one I have great confidence of its success, and I believe it capable of propelling a train with four or six hundred passengers across the Channel, in the short space of half an hour only, at the trifling expense of a little friction grease.

APPENDIX.

I have made a few remarks in the Introduction, and have likewise given a short description of the bridge and its erection. I have no doubt many will have a few important questions to ask; I will here answer a few of the most important that have already been asked. The first question proposed to me was, "How the winds would act on this bridge?" Having already explained the action of the winds on the aerial supports, the timbers and the king-posts for the girders are, I proposed, to be cylindrical, so as not to have a flat surface exposed to the winds. Now, as for the wire cords, it is well known that the winds have very little effect on them; the bridge itself is all skeleton work, so that the winds would pass through it the same, equally so, as between the wires of an electric telegraph. A second question has been asked, "Suppose one of the aerial supports should fail?" Well, even admitting one to fail, nothing could happen to the bridge, for the moment it failed, 20 or 30 of the other aerial supports would have to do a little more extra duty between them, till the failure could be replaced; this would be all in the failure of one of those. Again, some well said that there would be a continual wasting of gas from the aerial pontoon supports, which will cause its failure, through not having the same sustaining power. This could easily be remedied by having a main gas pipe of gutta percha, or any other substance, extending through the whole line of the bridge, and small ones coming from the main to the aerial supports, with valves inside, so that when there was not sufficient gas in the supports, the valve

would open from the main, and admit the gas till it was full, and then it would close again by its own pressure, so that we should always have them at the same sustaining power by this means; the main gas-pipe to be supplied from works on the coast, erected for that purpose. Another might ask, "Suppose a ship should strike against one of the main-stays?" But that is almost impossible, as the main-stays are 900 feet apart, and might be placed wider; secondly, lights could be put down them at night for signals. But some may say, "That is all very well, but supposing a ship should strike one of them?" Well, there is one thing to be said, that if a ship running against a rope of 180 or 200 feet in length, she would, as a matter of course, have a tendency with her bows to strike it off, but if she should carry it away, the other would have to do more duty till it could be replaced. The next probably may ask the important question about a carriage running off the rail. The first thing I answer in its favour is, that I have a groove wheel, this would give more security; the next thing the reader will please to remember, that the frame-work is 200 feet long, with a 40 foot guage, so that there would be but very little chance of its running off, with these important points in its favour. But still, supposing it should run off the rails, the effect would not be very great, for the whole of the carriage, with the frame-work, would be caught, as I have before alluded to, in the cross-bracing, just the same as catching a fish in a net: in fact it would serve as a net, through the line of rails, in case of such an accident; so that the reader will now see that I do not depend on one single point giving way throughout the whole undertaking.

AERIAL PONTON RAILWAY SUSPENSION BRIDGE.
FOR CROSSING THE CHANNEL.



L. LEE, DEL ET LITHOG.

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